EXERCISE **4** ?

Multiplying and Dividing Rational Numbers

Interactive test

From the school book

Remember Understand Apply Problem Solving

1 Complete the following :

1. The multiplicative identity of the rational numbers is .....
2. The multiplicative inverse of the number $\frac{3}{7}$ is .....
3. The multiplicative inverse of the number $-\frac{4}{9}$ is .....
4. The multiplicative inverse of the number -6 is .....
5. The multiplicative inverse of the number $3\frac{1}{2}$ is .....
6. The multiplicative inverse of the number 0.5 is .....
7. The multiplicative inverse of the number 1 is .....
8. The multiplicative inverse of the number -1 is .....
9. The multiplicative inverse of the number $\left(-\frac{3}{5}\right)^{\text{zero}}$ is .....
10. The multiplicative inverse of the number $\left|-\frac{3}{5}\right|$ is .....
11. The rational number $\frac{a-1}{5}$ has a multiplicative inverse if $a \neq$ .....
12. The rational number which has no multiplicative inverse is .....

2 Complete the following :

1. $\frac{2}{3} \times \left(-\frac{4}{5}\right) = -\frac{4}{5} \times$ .....
2. $\frac{2}{3} \times \left(-\frac{5}{7}\right) = \frac{5}{7} \times$ .....
3. $\frac{2}{3} \times \frac{3}{2} =$ .....
4. $\frac{4}{5} \div 1 =$ .....
5. $1 \div \frac{2}{7} =$ .....
6. $\frac{1}{4} \div 25\ \% =$ .....

7 $-\frac{4}{5} \times \ldots\ldots = -\frac{4}{5}$

8 $-\frac{4}{11} \times \ldots\ldots = 1$

9 $2\frac{3}{5} \times \ldots\ldots = 1$

10 $\ldots\ldots \times 0.8 = 1$

11 $4 \times \ldots\ldots = -5$

12 $\frac{2}{3}\left(2 + \frac{1}{2}\right) = \frac{2}{3} \times 2 + \ldots\ldots$

3 Choose the correct answer from the given ones :

1 If $\frac{2}{3} \times X = \frac{5}{7} \times \frac{2}{3}$, then $X = \ldots\ldots$

(a) $\frac{2}{3}$ (b) $\frac{5}{7}$ (c) $\frac{3}{2}$ (d) $\frac{7}{5}$

2 If $\frac{2}{5} \div X = \frac{2}{5} \times \frac{-7}{9}$, then $X = \ldots\ldots$

(a) $-\frac{9}{7}$ (b) $-\frac{7}{9}$ (c) $\frac{7}{9}$ (d) $\frac{9}{7}$

3 If $(X - 1)$ is the multiplicative inverse of $\frac{1}{5}$, then $X = \ldots\ldots$

(a) 4 (b) 5 (c) 6 (d) $1\frac{1}{5}$

4 $\left(\frac{2}{7} + \frac{3}{5}\right)$ is the multiplicative inverse of $\ldots\ldots$

(a) $-\frac{5}{12}$ (b) $\frac{12}{5}$ (c) $\frac{31}{35}$ (d) $\frac{35}{31}$

5 If three times a number is 27, then $\frac{1}{3}$ of that number equals $\ldots\ldots$

(a) -3 (b) 3 (c) -9 (d) 9

6 If $\frac{X}{y} = \frac{2}{3}$, then $\frac{3X}{2y} = \ldots\ldots$

(a) $\frac{1}{3}$ (b) 1 (c) $\frac{3}{2}$ (d) $\frac{9}{4}$

7 If $\frac{a}{b} = 70$, then $\frac{a}{2b} = \ldots\ldots$

(a) 35 (b) 68 (c) 72 (d) 140

8 If $\frac{|X|}{5} = 3$, then $X = \ldots\ldots$

(a) 5 (b) 10 (c) 15 (d) ± 15

4 State the property of the multiplication of rational numbers used in each of the following statements :

1 $-\frac{1}{2} \times \frac{2}{3} = \frac{2}{3} \times \left(-\frac{1}{2}\right)$

2 $-\frac{3}{7} \times \left(-\frac{7}{3}\right) = 1$

3 $-\frac{7}{20} \times \left(\frac{5}{2} \times 4\right) = \left(\frac{5}{2} \times 4\right) \times -\frac{7}{20}$

4 $\frac{5}{4} \times 1 = \frac{5}{4}$

5 $0.8 \times 0 = 0$

5 **Find the result of each of the following in the simplest form :**

1 $\frac{3}{5} \times \frac{2}{7}$
2 $-\frac{1}{2} \times \frac{2}{3}$
3 $-\frac{3}{8} \times \left(-\frac{5}{3}\right)$
4 $\frac{2}{6} \times -\frac{3}{4}$
5 $-\frac{2}{3} \times \frac{5}{8}$
6 $\frac{4}{5} \times \left(-\frac{3}{7}\right)$
7 $\left|-\frac{3}{7}\right| \times \left(-\frac{4}{3}\right)$
8 $\frac{1}{2} \times |-12|$
9 $\frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6}$

6 **Find the result of each of the following in the simplest form :**

1 $\frac{4}{5} \div \frac{3}{7}$
2 $-\frac{1}{6} \div \frac{5}{2}$
3 $-\frac{4}{11} \div \left(-\frac{4}{11}\right)$
4 $\frac{5}{27} \div \frac{1}{9}$
5 $\frac{5}{6} \div \left(-\frac{15}{2}\right)$
6 $-\frac{5}{16} \div \left(-\frac{11}{8}\right)$
7 $-\frac{5}{8} \div \frac{5}{8}$
8 zero $\div \frac{3}{5}$
9 $\frac{3}{4} \div (-9)$

7 **Find the result of each of the following in the simplest form :**

1 $3\frac{1}{2} \times (-4)$
2 $1\frac{1}{2} \times \left(-\frac{3}{2}\right)$
3 $-4\frac{2}{7} \times \left(-5\frac{1}{6}\right)$
4 $3\frac{1}{8} \times \left(-4\frac{1}{5}\right)$
5 $-0.5 \times \frac{2}{5}$
6 $2\frac{1}{2} \times 0.8$
7 $\left|-1\frac{1}{2}\right| \times \left|-\frac{5}{3}\right|$
8 $|-0.\dot{6}| \times 1\frac{1}{3}$

8 **Find the result of each of the following in the simplest form :**

1 $2\frac{1}{5} \div \frac{11}{5}$
2 $5\frac{1}{2} \div 2\frac{1}{5}$
3 $-4\frac{2}{7} \div 1\frac{1}{14}$
4 $-1 \div 2\frac{1}{4}$
5 $-4\frac{1}{3} \div \left(-3\frac{1}{4}\right)$
6 $0.5 \div 5\frac{1}{2}$
7 $-2\frac{3}{4} \div \left(-3\frac{1}{8}\right)$
8 $6\frac{1}{4} \div (-15)$
9 $2\frac{3}{5} \div \left(-1\frac{11}{15}\right)$

9 **Using the distribution property, find the value of each of the following in the simplest form :**

1 $\frac{5}{12} \times 3 + \frac{5}{12} \times 9$
2 $\frac{4}{9} \times 11 + \frac{4}{9} \times 16$
3 $4 \times \frac{8}{17} + 9 \times \frac{8}{17} + 4 \times \frac{8}{17}$
4 $\frac{6}{37} \times 7 + \frac{6}{37} \times 5 + \frac{6}{37} \times (-11)$
5 $\frac{4}{5} \times 13 - \frac{4}{5} \times 22 + \frac{4}{5} \times 9$
6 $\frac{7}{12} \times 5 + 9 \times \frac{7}{12} - 2 \times \frac{7}{12}$
7 $\frac{27}{11} \times \frac{9}{4} - \frac{27}{11} \times \frac{1}{4} + \frac{27}{11} \times 9$
8 $\frac{7}{13} \times 6 + \frac{7}{13} \times 8 - \frac{7}{13}$
9 $-\frac{3}{7} \times 8 + 5 \times \left(-\frac{3}{7}\right) + \left(-\frac{3}{7}\right)$
10 $\frac{22}{25} \times \frac{7}{11} + \frac{5}{11} \times \frac{22}{25} - \frac{22}{25}$
11 $35 \times \frac{3}{4} + 35 \times \frac{1}{2} - 35 \times \frac{1}{4}$

10 **Find the result of each of the following in the simplest form :**

1 $\left(\frac{5}{6}+\frac{2}{3}\right)\div\frac{3}{5}$

2 $\frac{3}{4}\times\left(\frac{1}{2}-\frac{1}{3}\right)$

3 $\left(-\frac{18}{5}\div\frac{9}{35}\right)\times\left(-\frac{3}{7}\right)$

4 $\left[-\frac{12}{25}\times\left(-\frac{5}{7}\right)\right]\div\left(-\frac{9}{14}\right)$

5 $\left(-1\frac{2}{3}\times4\frac{2}{3}\right)\div6\frac{1}{9}$

6 $\left(5\frac{1}{16}\div6\frac{3}{4}\right)\times\left(-7\frac{5}{9}\right)$

11 **Find the value of n in each of the following :**

1 $-\frac{7}{3}\times\left(-\frac{3}{7}\right)=n$

2 $n\times\frac{17}{3}=1$

3 $-\frac{7}{3}\times n=0$

4 $\frac{5}{7}\times n=\frac{5}{7}$

5 $n\times\left[\frac{1}{2}+\left(-\frac{3}{5}\right)\right]=n\times\frac{1}{2}+5\times\left(-\frac{3}{5}\right)$

12 **If $x=-\frac{1}{3}$, $y=\frac{3}{4}$ and $z=-3$, find the numerical value of each of the following :**

1 $x\,y\,z$

2 $x\,y+y\,z$ « $\frac{3}{4}$, $-\frac{5}{2}$ »

13 **If $a=1\frac{3}{4}$, $b=\frac{12}{7}$ and $c=\frac{2}{3}$, then find the numerical value of each of the following :**

1 $a\,b\,c+3$

2 $a\,b-c$ « 5 , $\frac{7}{3}$ »

14 If $x=\frac{5}{8}$ and $y=\frac{1}{2}$, find in the simplest form the numerical value of : $\frac{x+y}{x-y}$ « 9 »

15 **If $x=\frac{3}{2}$, $y=-\frac{1}{4}$ and $z=-2$, find in the simplest form the numerical value of each of the following :**

1 $\frac{1}{x\,y\,z}$ « $\frac{4}{3}$ »

2 $x-(z\div y)$ « $-\frac{13}{2}$ »

3 $\frac{x}{y}-\frac{z}{y}$ « − 14 »

4 $(x+z)\div(y-z)$ « $-\frac{2}{7}$ »

5 $\frac{x+y}{z}$ « $-\frac{5}{8}$ »

Life Applications

16 The weights of things on the surface of the moon = $\frac{1}{6}$ their weights on the surface of the Earth.

If the weight of a man on the Earth = $76\frac{4}{5}$ kg. , find his weight on the moon.

« $12\frac{4}{5}$ kg. »

17 If water flows through a pipe at a rate of $2\frac{1}{2}$ litres per minute, how long will it take to fill three containers 20 litres each ?

« 24 minutes »

18 How many pieces of wire the length of each is $3\frac{3}{4}$ metres can be cut from a wire of length 60 metres ?
Will any piece of wire be left over ?
If so , how long will it be ?

« 16 pieces »

For excellent pupils

19 **Use the distribution property to find the value of each of the following in its simplest form :**

1 $\frac{7}{15} \times \frac{4}{25} + \frac{16}{25} \times \frac{2}{3} + \frac{7}{15} \times \frac{1}{5} + \frac{16}{25} \times \left(-\frac{1}{5}\right)$

2 $\frac{2}{13} \times 3 + \frac{2}{13} \times 8 + \frac{4}{13}$

20 **Find the product of :**

$\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \cdots \times \frac{99}{100}$

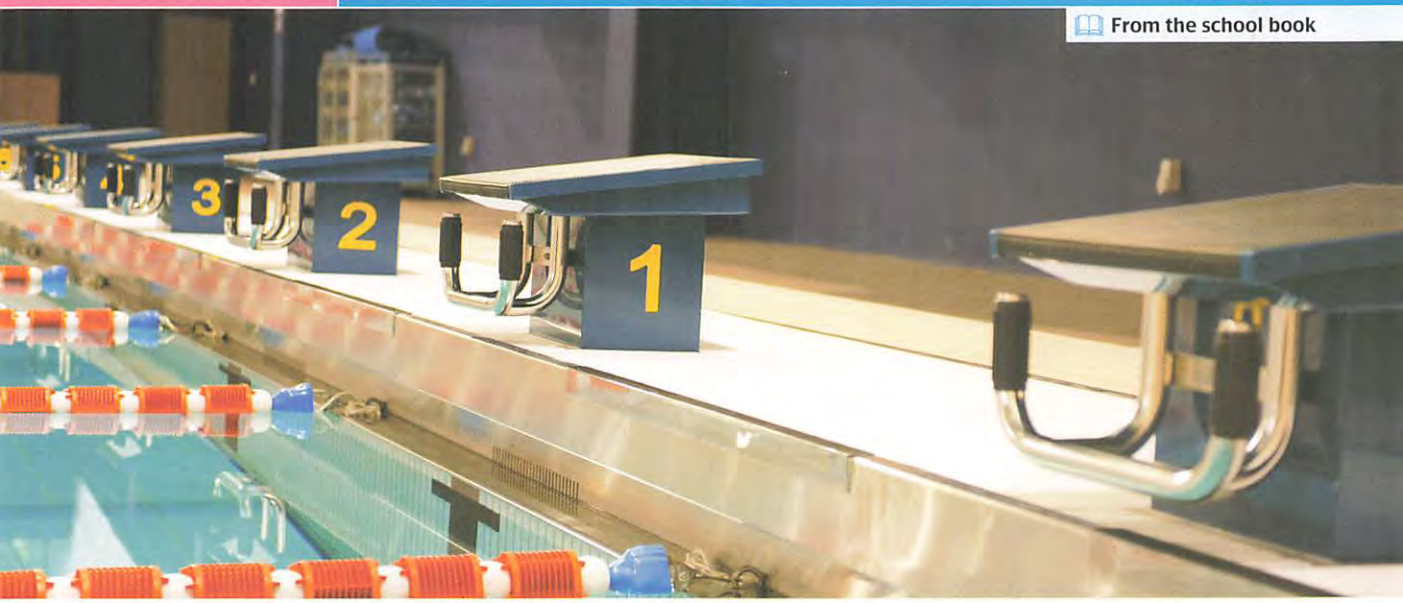
What is the product when the last rational number is $\frac{n-1}{n}$?

EXERCISE **5** ?

Applications on Rational Numbers

Interactive test

From the school book



Remember · Understand · Apply · Problem Solving

1 Find a rational number in the middle of the way (half-way) between :

1 $\frac{3}{8}$, $\frac{5}{8}$

2 $\frac{2}{5}$, $\frac{4}{5}$

3 $-\frac{3}{4}$, $\frac{3}{4}$

4 $\frac{1}{2}$, $\frac{7}{8}$

5 $-\frac{1}{2}$, $-\frac{3}{4}$

6 0.1 , $-\frac{2}{5}$

7 $-\frac{11}{9}$, $-\frac{13}{35}$

8 $-4\frac{3}{7}$, $8\frac{1}{3}$

9 zero , $\frac{2}{5}$

2 Find a rational number lying at :

1 One fourth of the way between $\frac{5}{7}$, $-\frac{3}{7}$ *from the side of the smaller number.*

2 One fourth of the way between $\frac{1}{3}$, 1 *from the side of the greater number.*

3 One third of the way between $-\frac{3}{5}$, $-\frac{4}{5}$ *from the side of the greater number.*

4 One third of the way between $\frac{4}{7}$, $1\frac{3}{4}$ *from the side of the smaller number.*

5 One fifth of the way between $-\frac{1}{2}$, $-\frac{2}{5}$ *from the side of the greater number.*

6 One fifth of the way between $-\frac{2}{3}$, $-\frac{3}{5}$ *from the side of the smaller number.*

7 One tenth of the way between $\frac{5}{6}$, $\frac{2}{3}$ *from the side of the smaller number.*

8 One eighth of the way between zero , $-1\frac{1}{2}$

3 **Choose the correct answer from the given ones :**

1 If $\frac{2}{3}$ lies at the middle of the way between x and $\frac{1}{2}$, then $x =$ .....

(a) $\frac{1}{3}$ (b) $\frac{3}{4}$ (c) $\frac{5}{6}$ (d) $\frac{7}{8}$

2 If $a \times \frac{b}{2} = \frac{a}{2}$, $a \neq 0$, then $b =$ .....

(a) 1 (b) 0 (c) a (d) $\frac{a}{2}$

3 If $\frac{x}{3} - 4 = 6$, then $\frac{x}{3} + \frac{2}{3} =$ .....

(a) 1 (b) 10 (c) $\frac{32}{3}$ (d) x

4 If $\frac{x}{y} = 1$, then $2x - 2y =$ .....

(a) 3 (b) 2 (c) 1 (d) 0

5 If $x + \frac{2}{x} = 5 + \frac{2}{5}$, then $x =$ .....

(a) $\frac{1}{5}$ (b) $\frac{4}{5}$ (c) $\frac{5}{2}$ (d) 5

6 If $5a = 45$ and $ba = 1$, then $b =$ .....

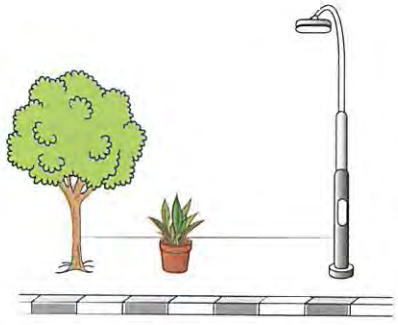
(a) $\frac{1}{45}$ (b) $\frac{1}{9}$ (c) $\frac{1}{5}$ (d) 9

7 If $\frac{3}{7}x = 42$, then $\frac{5}{7}x =$ .....

(a) 70 (b) 45 (c) 30 (d) 10

Life Application

4 In one of the projects of paving and afforesting roads , a tree was planted at a distance of 3.3 m. from the beginning of the road and a lamp post was fixed at a distance of $7\frac{1}{2}$ m. from the beginning of the road. If we want to put a flower bed at the third of the distance between them from the side of the tree, at which distance should we put the flower bed from the beginning of the road ?



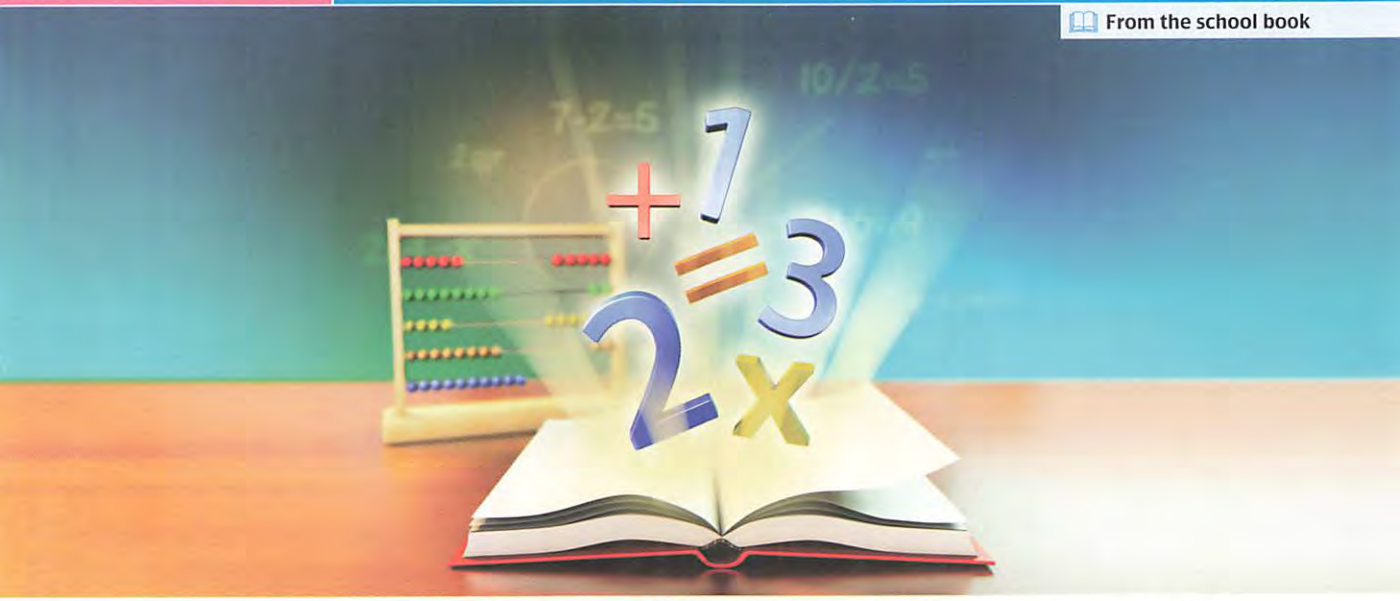
« 4.7 m. »

EXERCISE **6**

Algebraic Terms and Algebraic Expressions

Interactive test

From the school book



Remember Understand Apply Problem Solving

1 Complete the following table :

Algebraic term	-7	$2\,a\,b^2$	3	$7\,a\,b^3c$	$-8\,x^2\,b$	$x\,y^2$
Coefficient	-7	2	.....	.....	.....	.....
Degree	zero	$1+2=3$	.....	.....	.....	.....

2 Complete the following table :

The algebraic expression	Number of terms	Name	Degree
$-3\,a^5\,b$	1	monomial	6
$3\,x^2+y$	2	binomial	2
$5\,x^3-7\,x+4$	.....	trinomial	.....
$2\,a^2\,b+3\,a\,b^2-a^2\,b^2$	.....	.....	.....
$x^2\,y^2-3\,x\,y^4$	.....	.....	.....
$a^2\,b-3\,a\,b^3+2\,a^3\,b^2+b^4$	.....	.....	.....

3 Complete the following :

1. The degree of the term $3\,x^2\,y$ is ..... and its coefficient is .....
2. The coefficient of the algebraic term $\frac{x^3\,y\,z^2}{2}$ is ..... and its degree is .....
3. The coefficient of the algebraic term x is ..... and its degree is .....

4 The degree of the absolute term in any algebraic expression is .....

5 The coefficient of the algebraic term $(-2)^3$ is ..... and its degree is .....

6 $5x^2 + 3$ is an algebraic expression of the ..... degree.

7 The number of terms of the algebraic expression $5y^2 - 3xy + 2x^2$ is ..... and its degree is .....

4 Choose the correct answer from the given ones :

1 The degree of the algebraic term $x^4 y$ equals the degree of the algebraic term .....

(a) $x^2 y^2$ (b) $x^2 y^3$ (c) $x^4 y^2$ (d) $y^4 x^2$

2 The degree of the algebraic expression $5x^3 - 3xy + 2y^2$ equals the degree of the algebraic expression .....

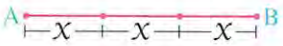
(a) $5a^2 - 2ab + 3$ (b) $2x^2 y^2 - 3x^2 y + 5y^3$

(c) $2x + 5x^2 y + y^2$ (d) $a^3 + 2a^2 b - b^4$

3 The algebraic term b^3 = ...

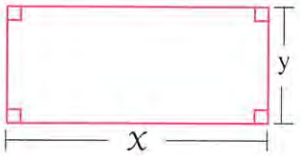
(a) $3 \times b \times b$ (b) $b + b + b$ (c) $b \times b \times b$ (d) $3 \times b$

4 The algebraic term that represents the length of $\overline{AB}$ in the opposite figure is .....



(a) x^3 (b) $3x$ (c) x (d) $\frac{x}{3}$

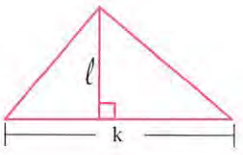
5 The algebraic term which expresses the area of the opposite figure is .....



(a) $x + y$ (b) $2x + 2y$

(c) xy (d) $x^2 y^2$

6 The algebraic term which expresses the area of the opposite figure is .....

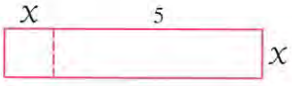


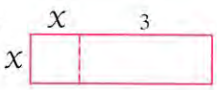
(a) $2k\ell$ (b) $\frac{1}{2} k\ell$

(c) $\frac{1}{2} k + \ell$ (d) $k\ell$

7 Which of the following represents the expression $3x + 2x$?

(a) 

(b) 

(c) 

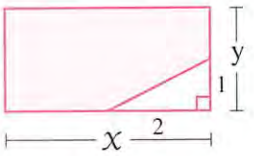
(d) 

5 1 Arrange the terms of the algebraic expression $7\,a\,b + 5\,a^5\,b^3 - 3\,a^2\,b^5$ according to the descending order of the indices of a

2 Arrange the terms of the algebraic expression $5\,x + x^2 - 7 + x^3$ according to the ascending order of the indices of x

Geometric Applications

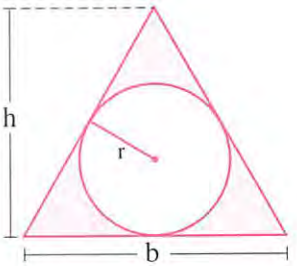
6 Write the algebraic expression which represents the area of the coloured part in the opposite figure and determine its degree.



7 **In the opposite figure :**

Write the algebraic expression which expresses the area of the coloured region , then state its degree

(The area of the circle = $\pi\,r^2$)



For excellent pupils

8 **Complete the following :**

1 If the algebraic term : $4\,x\,y^{k-1}$ is of the fifth degree , then k = ...

2 If the two algebraic terms : $2\,a^3\,b^{m+1}$, $3\,a^n\,b^6$ are of the ninth degree , then n = ... , m = ...

3 If the degree of the algebraic term $y^{2\,m}$ is the degree of the algebraic term $5\,x^2\,y^4$, then m = ...

4 If the algebraic expression $x^4 + 3\,x^{n+1} - 2\,x^2 + 5$ is arranged according to the descending order of the indices of x where $n \in \mathbb{Z}$, then n = ...

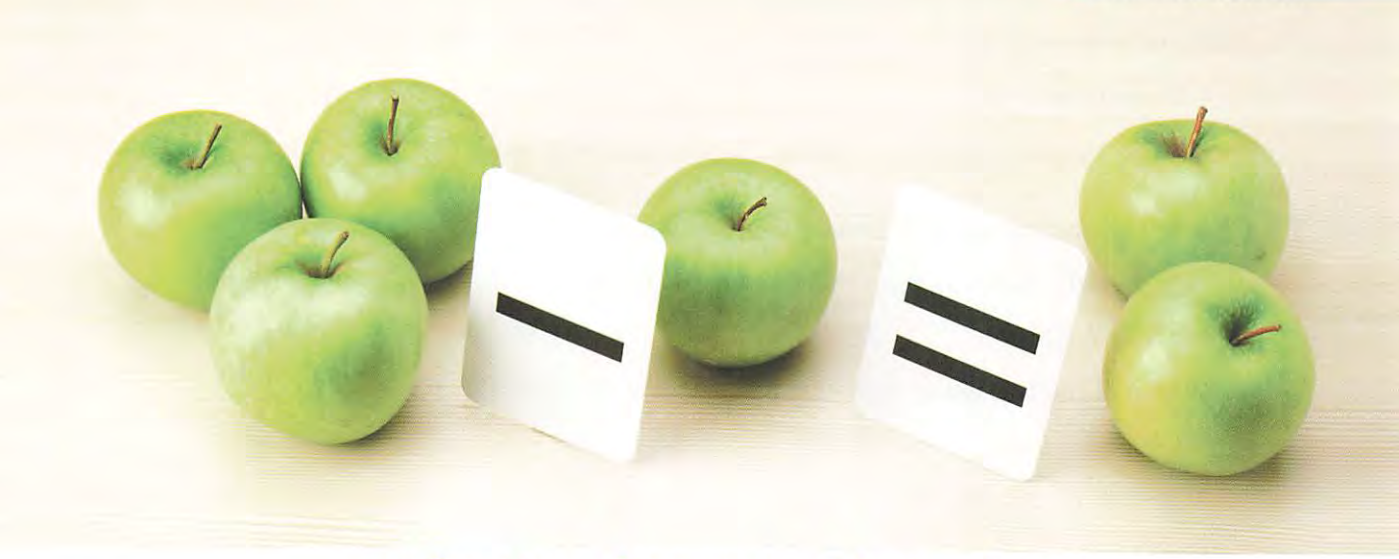
5 If the algebraic expression $2\,x\,y^2\,z^3 + 3\,x^2\,y\,z^n$ is of the sixth degree where n is a natural number , then $n \in \{.....\}$

EXERCISE 7 ?

Like Algebraic Terms

Interactive test

From the school book



Remember Understand Apply Problem Solving

1 Find the result of each of the following :

1 $3x + 2x$

2 $5x - 2x$

3 $4x - 11x$

4 $-7x - 3x$

5 $-5a^2 + 3a^2$

6 $-2x^2y + 3yx^2$

7 $2a + 3a - 4a$

8 $3ab - 2ba + 5ba - 6ab$

9 $\frac{5x}{4} + \frac{3x}{4}$

10 $\frac{3x}{7} - \frac{x}{7}$

2 Answer each of the following :

1 Subtract : y^2 from $-3y^2$

2 Subtract : $-6x^2y$ from $9x^2y$

3 What is the increase of : $-2x$ than $-5x$?

4 What is the increase of : $3a^2b$ than a^2b ?

5 What is the decrease of : $-3ab$ than $2ab$?

6 What is the decrease of : $6x^2y$ than $-7x^2y$?

3 Complete each of the following :

1 The result of subtracting 3 a from 7 a is .....

2 The result of subtracting $-3x^2$ from $5x^2$ is .....

3 The result of subtracting 2 m from zero is .....

4 The result of subtracting 2 X from – 3 X is .....

5 5 a increases 3 a by .....

6 7 X increases – 3 X by .....

7 4 X decreases 7 X by .....

8 5 X decreases 3 X by .....

9 2 X decreases 4 X by ..... while 2 X increases 4 X by .....

4 Choose the correct answer from the given ones :

1 Which of the following are two like algebraic terms ?

(a) X^2 , 2 X (b) 7 X^2 , 2 X^7 (c) 3 b^2 a , – a b^2 (d) 2 a^2 , 2 b^2

2 Which of the following algebraic terms is like the algebraic term 2 X^2 y ?

(a) 2 y^2 X (b) y X^2 (c) 2 X^2 (d) X^2 y^2

3 7 X^2 – 2 X^2 = ...

(a) 5 (b) 5 X^2 (c) 5 X (d) 9 X^2

4 2 X y – 2 y X = ...

(a) X y (b) 2 X y (c) 4 y X (d) zero

5 $\frac{1}{2}$ X^2 a + $\frac{1}{2}$ a X^2 = ...

(a) $\frac{1}{4}$ X^2 a (b) $\frac{1}{2}$ a X^2 (c) 2 a X^2 (d) X^2 a

6 a + a + a = ...

(a) 3 a^3 (b) 3 a (c) a^3 (d) a + 3

5 Complete each of the following :

1 ..... + 2 a^2 = 7 a^2

2 3 X^2 – ..... = X^2

3 2 m^2 + ... = zero

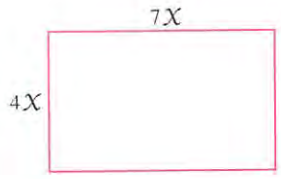
4 5 a^2 b – ..... = 7 a^2 b

5 3 a^2 b + 2 a^2 b = ... – 2 a^2 b

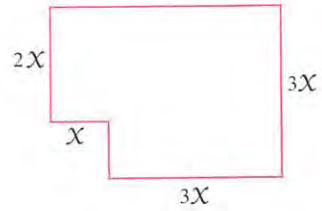
6 If 4 X – y = 11 , y = 3 X , then X = ...

7 If a = 2 b , b = 15 , then the numerical value of the expression : a + 2 b + 5 = ...

8 The perimeter of the opposite rectangle equals ..... length units.



9 The perimeter of the opposite figure equals ..... length units.



6 If the sum of two terms is $12\,x^2y$ and one of them is $4\,x^2y$, find the other term.

7 **Reduce to the simplest form :**

1. $3a + 2b + 5a + 4b$
2. $3x - 5y - x + 2y$
3. $2x - 4y - 9x - 3y$
4. $19m - 4n + 11m - 17n + 9n$
5. $2a + 7 - 5a - 4 - a$
6. $5a + 2b - 8a - 7b + 3a$
7. $2y - 3x - 7y - 5x - y + x$
8. $4a + 9b + 5a - 2b + 6b - 3a$

8 **Reduce each of the following algebraic expressions :**

1. $5x - 3x^2 + 4 - 7x^2 - 6x - 1$
2. $6x^2y - 3xy^2 + 2xy^2 - 5x^2y + 2x^2y^2$
3. $a^2 + 4a - 5 + 3a^2 - 6a + 1$
4. $5x^2 - 2x + 8 - 7x - 3 + x^2$

Geometric Applications

9 **Write the sum of the areas of the rectangles as an algebraic expression :**

1.

1	$3x$
x	$3x^2$

2.

$2x^2$	x
$4x$	2

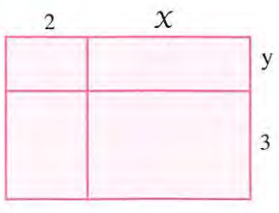
3.

$5x^2$	$2x$
$15x$	6

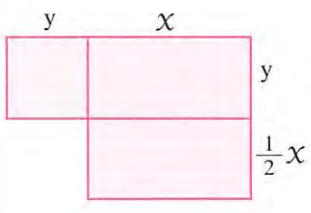
10 **Write the algebraic expression which expresses the perimeter of the coloured part in each of the following :**

1.

2.



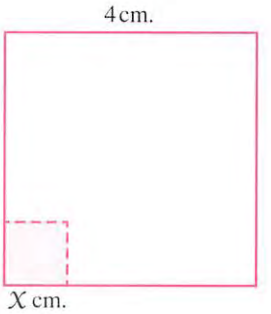
3.



11 **In the opposite figure :**

A square whose side length is x cm. was cut from a square with side length 4 cm.

Find the perimeter of the remained part.



For excellent pupils

12 **Complete the following :**

1 If the two algebraic terms $2\,a^2\,b^{n+2}$ and $5\,a^2\,b^5$ are like terms , then n = ...

2 If the two algebraic terms $9\,x^m\,y^{m+n}$ and $4\,x\,y^3$ are like terms , then m = ... and n = ...

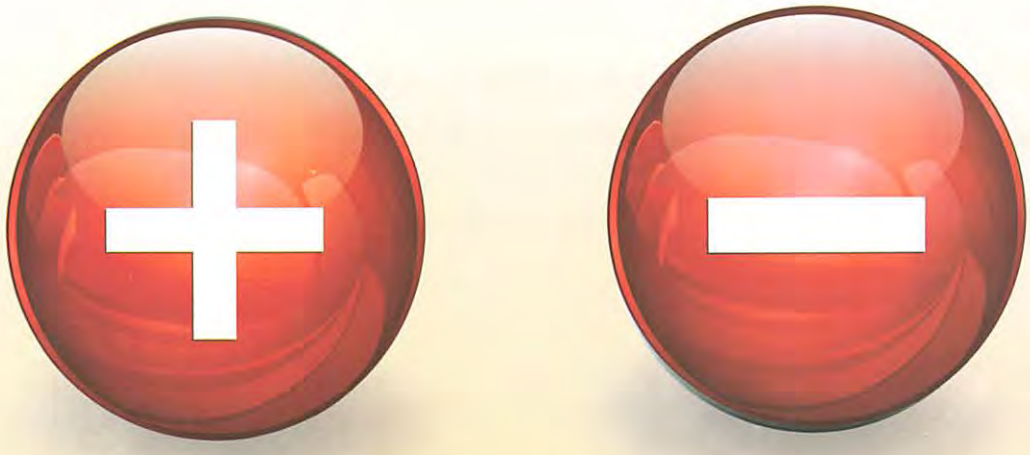
3 If $3\,x^m + 7\,x^n = 10\,x^6$ where $x \neq 0$, then m + n = ...

EXERCISE **8**

Adding and Subtracting Algebraic Expressions

Interactive test

From the school book



Remember Understand Apply Problem Solving

1 Find the sum of each of the following :

1 $\begin{array}{r} 3a - 4b + 6c \\ 5a + 6b - 2c \\ \hline \end{array}$

.....

2 $\begin{array}{r} 3a - 7b - 5c + 2 \\ -a + 4b + c - 5 \\ 2a + 3c + 3 \\ \hline \end{array}$

.....

3 $\begin{array}{r} 5x + 2y - z + 2 \\ 7x + y - 3z + 3 \\ -2x - 5y + 4z - 1 \\ \hline \end{array}$

.....

4 $\begin{array}{r} -2a^3 + 3a^2b - b^3 \\ -5a^2b + 3ab^2 - 2b^3 \\ 5a^3 - 4ab^2 + 3b^3 \\ \hline \end{array}$

.....

2 Find the sum of each of the following :

1 $3x - 2y + 5$, $x + 2y - 2$

2 $3\ell - 4m + 5n$, $4m - 5n - \ell$

3 $3n^2 + 5n - 6$, $-n^2 - 3n + 3$

4 $5m^2 + 2\ell m$, $\ell^2 - 3m^2 - 2\ell m$

5 $2a^2b - 3ab^2 + b^3$, $-a^2b + b^3$

6 $3a^3 - 2ab^2 + b^3$, $a^3 + 4a^2b - b^3$

3 Find the sum of each of the following :

1 $3a + 2b - 5$, $2a - 7b + 4$, $5b - 4a + 3$

2 $3x + 3y - z$, $3x + 3z - 2y$, $x + 2y + z$

3 $5x^2 - 3x + 9$, $x^2 + 2x - 5$, $x - 3 - 6x^2$

4 $3x - 4x^2 + 2$, $x^2 + x - 5$, $3 + 3x^2 - 4x$

5 $3x - 4x^2 + x^3$, $2x^2 - 6x + 5$, $4 + 7x - x^3$

6 $2x^2 - 3xy + y^2$, $xy - 2y^2 + x^2$, $3xy - 2x^2$

4 Subtract :

1 $X - 2$ **from** $2X - 5$

2 $2X + 6y - 7$ **from** $2X - 5y + 2$

3 $3X^2 - 1 - 5X$ **from** $1 - 5X + 6X^2$

4 $3ab^2 - 4a^2b - b^3$ **from** $a^3 - 2ba^2 + 2b^3$

5 What is the increase of :

1 $5a + 7b$ **than** $3a - 2b$

2 $7X + 5y + z$ **than** $2X - y + z$

3 $X^2 - 5X - 1$ **than** $3X^2 + 2X - 3$

4 $3X^2y - 5X$ **than** $3X - 4X^2y$

6 What is the decrease of :

1 $2a + 3b$ **than** $5b - 3a$

2 $3y^2 - 2Xy + X^2$ **than** $3X^2 - 5Xy + y^2$

3 $2a^2 - 3ab - 5b^2$ **than** $4b^2 + 3a^2 + ab$

4 $5X^2 + 2X$ **than** $7X^2 - X + 3$

7 Choose the correct answer from the given ones :

1 $2X + 3y$ increases $3y - 2X$ by .....

(a) $-6y$ (b) $-4X$ (c) $4X$ (d) $6y$

2 The result of subtracting $7a$ from $15a - 4$ is .....

(a) $-8a + 4$ (b) $8a + 4$ (c) $8a - 4$ (d) $-22a - 4$

3 The sum of $X + 2y - 3z$ and $-2y - X - 3z$ is .....

(a) $-6z$ (b) zero (c) $6z$ (d) $2X - 4y + 6z$

4 The additive inverse of $X + 2$ is .....

(a) $X - 2$ (b) $-X - 2$ (c) $2 - X$ (d) 2

5 The additive inverse of $3a - 4b + 5$ is .....

(a) $-3a + 4b + 5$ (b) $-3a - 4b - 5$

(c) $3a + 4b - 5$ (d) $4b - 3a - 5$

8 What is the expression which should be added to $2x - 3x^2 + 5$ to get $6 + x^2 - x$?

9 What is the expression which should be subtracted from $2x - 3y + 6z - \ell$ to get $5z - 4y + 3x - 2\ell$?

10 What is the expression which should be added to $3a^2 - 5ab + 2b^2$ to get zero ?

11 If the sum of two algebraic expressions is $5x - 7y + 9$ and if one of the two expressions is $2y + 3x - 4$, find the other expression.

12 Subtract $2b + 5a$ from $6a + 7b - 2$, then find the numerical value of the result when $a = 2$ and $b = 1$ « 5 »

13 Add $7x - 6y - z$ and $y - 3x - 5z$, then subtract the result from $5x + 5y - z$

14 What is the decrease of $2a - 8b - c$ than the sum of $3a - 3b + c$ and $2a - 4b - 8c$?

15 Add the expressions $3\ell - 2m + 7n$, $5m - 4\ell - 2n$ and $2\ell - 3n - m$, then subtract the result from $2\ell - 4m + 5n$

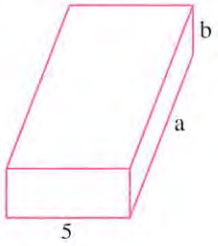
16 By what expression is $3x^2 - 5 + 2x$ increased than the sum of $x + 5x^2 + 1$ and $2x^2 - 4 - 2x$?

17 Add $3x^2 + 2xy - 5$ and $-2x^2 - 3xy + x$, then find the numerical value of the result when $x = -1$ and $y = 2$ « – 3 »

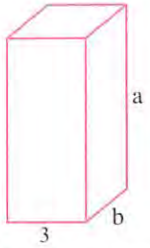
18 If $x = a - 2b + c$, $y = 2a + 3b - 4c$ and $z = b - 4a + c$, find the expression $x + y - z$ in terms of a , b and c

Geometric Application

19 **In the following figure, calculate the total surface area of the two solids together :**



First solid



Second solid

For excellent pupils

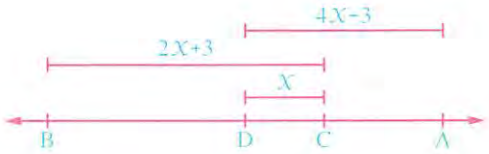
20 If $a + b = \frac{5}{4}$, $b + c = \frac{3}{4}$, $a + c = \frac{1}{2}$, **then find the value of :**

1 $a + 2b + c$ « 2 »

2 b « $\frac{3}{4}$ »

21 **In the opposite figure :**

Write the algebraic expression that expresses the length of $\overline{AB}$



EXERCISE 9

Multiplying and Dividing Algebraic Terms

Interactive test

From the school book

Remember Understand Apply Problem Solving

1 Multiply :

1. $(5\,x) \times (3\,y)$
2. $(-3\,a) \times (7\,c)$
3. $(2\,x) \times (-3\,x)$
4. $-8\,y^5 \times (-7\,y^4)$
5. $(2\,x\,y) \times (-3\,x^2)$
6. $5\,x^3\,y^4 \times 2\,x\,y^2$
7. $5\,a\,b^2 \times (-2\,a^2\,b)$
8. $(x) \times (x) \times (2\,x)$
9. $(5) \times (-2\,a) \times (4\,a)$
10. $a\,b \times (-3\,a) \times (-2\,b)$
11. $(2\,x^3) \times (-3\,x^2) \times (-5\,x^4)$
12. $(4\,x^3\,y) \times (-2\,x\,y^2) \times (-3\,x^2\,y^5)$

2 If the symbols represent non-zero integers , find the quotient of each of the following :

1. $6\,a \div 2$
2. $12\,x \div (-x)$
3. $10\,c \div 2\,c$
4. $-14\,x^2 \div 7\,x$
5. $-25\,a^6 \div (-5\,a^2)$
6. $24\,c^5 \div (-24\,c^5)$
7. $9\,x^5\,y^4 \div 6\,x^3\,y$
8. $-32\,a^3\,b^6 \div (-4\,a^3\,b^2)$
9. $8\,m^4\,n^3 \div (-4\,m\,n^2)$
10. $-18\,x^5\,y^6\,z^3 \div (-6\,x^3\,y^3\,z^3)$

3 Simplify :

1. $\frac{2}{3}\,t^4 \times \frac{3}{2}\,t^4$
2. $\frac{2}{7}\,a^2 \times 21\,a^5$
3. $\frac{15\,a^3\,b}{2} \times \frac{8\,a\,b^2}{10}$
4. $(3\,x^3) \times \left(\frac{1}{6}\,x^2\right)$
5. $\frac{4\,h^3\,k^3}{7} \times \frac{21\,h\,k^5}{2}$
6. $4\,m^3 \times \frac{1}{4}\,m^2 \times (-7\,m)$

4 Choose the correct answer from the given ones :

1 $(2\,x) \times (5\,x) =$ .....

(a) $10\,x$ (b) $7\,x$ (c) $7\,x^2$ (d) $10\,x^2$

2 $2\,x\,y \div$ zero = ...

(a) $2\,x\,y$ (b) $x\,y$ (c) zero (d) meaningless.

3 📖 $3\,a^4\,b \times 5\,a^2\,b^2 \times 2\,a^3 =$ .....

(a) $60\,a^{11}\,b^3$ (b) $30\,a^{10}\,b^2$ (c) $15\,a^{10}\,b^3$ (d) $30\,a^9\,b^3$

4 $-6\,x^3\,y \div 2\,x\,y =$ .....

(a) $-3\,x^3$ (b) $-3\,x^2\,y$ (c) $-3\,x^4\,y^2$ (d) $-3\,x^2$

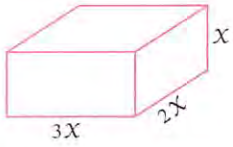
5 📖 If 2 b is the edge length of a cube , then its volume is .....

(a) $4\,b^2$ (b) $2\,b^3$ (c) $4\,b^3$ (d) $8\,b^3$

6 If the area of a rectangle is $24\,x^3$ and its length is $8\,x^2$, then its width is .....

(a) $3\,x^5$ (b) $3\,x$ (c) $3\,x^2$ (d) 3

7 The volume of the opposite cuboid equals .....



(a) $6\,x^3$ (b) $6\,x$

(c) $5\,x^3$ (d) $6\,x^2$

8 📖 If the price of 4 shirts is x pounds , then the price of 40 shirts of the same kind equals ..... pounds.

(a) $10\,x$ (b) $\frac{x}{40}$ (c) $\frac{5\,x}{2}$ (d) $\frac{40}{4}$

9 📖 You drove 200 km. in 3 hours. Which expression represents your average speed if "d" represents distance and "t" represents time ?

(a) d t (b) $\frac{d}{t}$ (c) $\frac{3\,t}{200\,d}$ (d) d + t

5 Complete the following if the symbols represent non-zero integers :

1 $\frac{4\,y^5}{y^3} + 2\,y^2 =$ .....

2 $(6\,x^3 \div 2\,x) - 2\,x =$ .....

3 $(10\,x^2 + 5\,x^2) \div 5\,x =$ .....

4 $(5\,a \div a) +$ ..... = zero

5 $81\,\ell^4 \div$ ..... $= 27\,\ell^3$

6 ..... $\div 7\,a^3 = -5\,a^2$

7 $15\,x^2\,y^3 \div$ ..... $= 3\,x\,y^2$

8 ..... $\div (-4\,x^3\,y^2) = 16\,x^4\,y^4$

9 If $3\,a \times n = 12\,a^4$, then n = ...

6 📖 Complete :

1 $36\,a^5\,b^8 = 12\,a^3\,b^2 \times$ .....

2 $9\,a^5 = 3\,a \times$ .....

3 $-4\,c^3\,d^3 = 2\,c\,d^2 \times$ .....

4 $98\,a^7\,b^4 =$ ..... $\times 14\,a^7\,b$

5 $36\,a^8\,b^5 = 6\,a\,b^2 \times 3\,a^4\,b \times$ .....

6 $42\,x^4\,y^5 = 3\,x^2\,y \times 2\,x\,y \times$ .....

7 If $x \neq$ zero , $y \neq$ zero and n is a positive number , simplify :

1 $\dfrac{27\,y^{2n+4}}{3\,y^{2n+3}}$

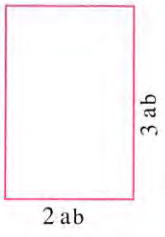
2 $\dfrac{-24\,x^{5n+1}\,y^{2n}}{36\,x^{5n}\,y^{n}}$

Geometric Applications

8 A cuboid of dimensions x cm. , $2x$ cm. and $4x$ cm. was melted to make small cubes with edge length x cm. for each one.
Find the maximum number of the resulted small cubes. « 8 »

9 Calculate the perimeter and the area of each figure :

1



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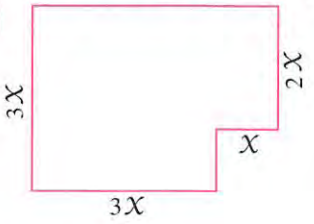

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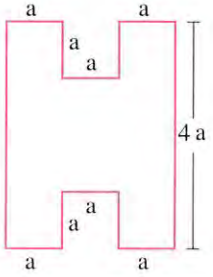
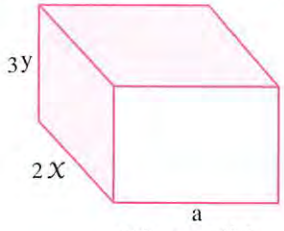
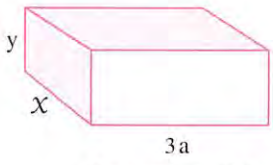


10 Calculate the sum of the total surface areas of the two solids :



First solid

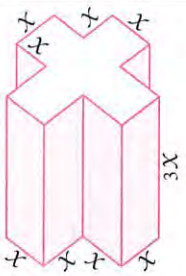


Second solid

For excellent pupils

11 Three tennis balls fit into a cuboid box where the balls touch all faces of the box.
Calculate the ratio between the volume of the three balls and the volume of the box.
(Given that : the volume of the sphere $= \frac{4}{3}\,\pi\,r^3$, $\pi \simeq 3.14$) « $\frac{157}{300}$ »

12 Calculate the total surface area and the volume of the opposite solid.



Test 1

Total mark 10

1 Choose the correct answer from the given ones : (3 marks)

1 $7x^2 - 2x^2 =$ .....

(a) 5 (b) $5x^2$ (c) $5x$ (d) $9x^2$

2 The algebraic term $b^3 =$ .....

(a) $3 \times b \times b$ (b) $b + b + b$ (c) $b \times b \times b$ (d) $3 \times b$

3 If $5a = 45$ and $ba = 1$, then $b =$ .....

(a) $\frac{1}{45}$ (b) $\frac{1}{9}$ (c) $\frac{1}{5}$ (d) 9

---

2 Complete : (3 marks)

1 The number that lies half the way between $\frac{1}{2}$, $\frac{3}{4}$ is .....

2 The result of subtracting $-3x^2$ from $5x^2$ is .....

3 $\frac{4y^5}{y^3} + 2y^2 =$ ..... where $y \neq 0$

---

3 Using the distribution property , find the value of : (2 marks)

$\frac{3}{7} \times 9 + \frac{3}{7} \times 6 - \frac{3}{7}$

---

4 Subtract : $5x^2 + y^2 - 3xy$ **from** $3xy + 5x^2 + y^2$ (2 marks)

Test 2

Total mark: 10

1 Choose the correct answer from the given ones : (3 marks)

1 If the algebraic expression : a $x^3 + 5x^2 + 7x - 9$ is of the second degree , then a = ...

(a) 1 (b) 3 (c) – 2 (d) zero

2 a + a + a = ...

(a) $3a^2$ (b) 3 a (c) a^3 (d) a + 3

3 If the area of a rectangle is $24x^3$ and its length is $8x^2$, then its width is .....

(a) $3x^5$ (b) $3x$ (c) $3x^2$ (d) 3

---

2 Complete : (3 marks)

1 $3x$ decreases $5x$ by .....

2 The degree of the absolute term in any algebraic expression is .....

3 $\frac{-4}{5} \times$ ..... = 1

---

3 If a = $\frac{1}{2}$, b = $\frac{2}{5}$, c = $\frac{1}{5}$ (2 marks)

, find the numerical value of the expression : (a + b) ÷ c

---

4 Add $3x^2 + 2xy - 5$ and $-2x^2 - 3xy + x$ (2 marks)

, then find the numerical value of the result when : $x = -1$ and $y = 2$

Exercise **4**

Congruent Triangles

From the school book

● Remember ● Understand ○ Apply Problem Solving

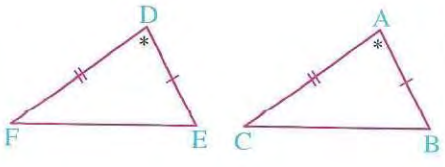
Interactive test

1 Complete the following :

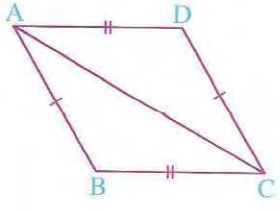
1. Any two triangles are congruent if two sides and .....
2. Any two triangles are congruent if two angles and ..... in one of the triangles are congruent to their corresponding elements in the other.
3. Any two triangles are congruent if each ..... is congruent to its corresponding ..... in the other triangle.
4. Any two right-angled triangles are congruent if .....
5. The diagonal of the rectangle divides its surface into two ..... triangles.
6. If $\Delta ABC \equiv \Delta XYZ$, then AB = ... and m ($\angle$ Z) = m ($\angle$ .....)
7. If AB = LM , BC = MN and m ($\angle$ B) = m ($\angle$ M) , then the two triangles ..... and ..... are congruent.

2 In each of the following figures , show if the two triangles are congruent or not.
If they are congruent , name the case of congruence.
If they are not congruent , give reason "Given that the similar signs denote the congruence of the shown elements labelled by these signs".

1



2



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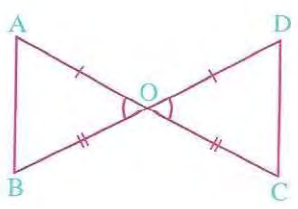

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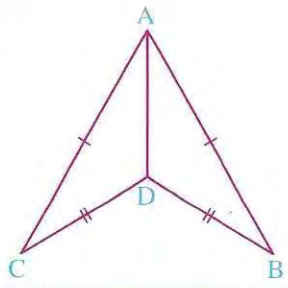

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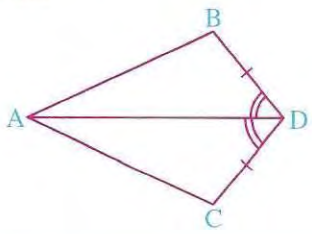

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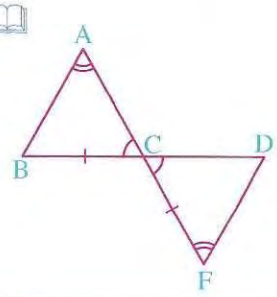

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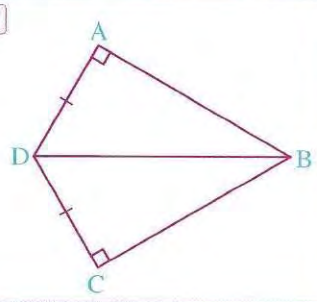

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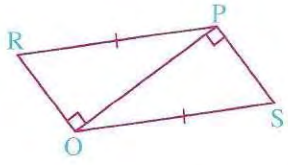

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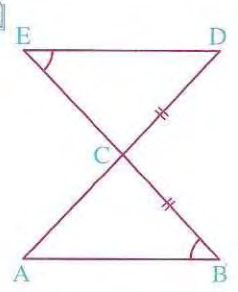

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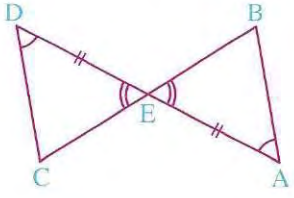

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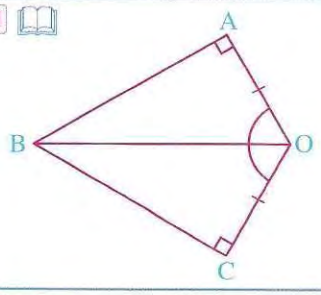

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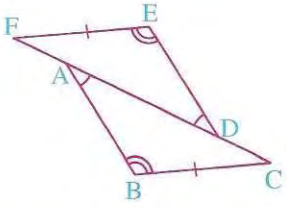

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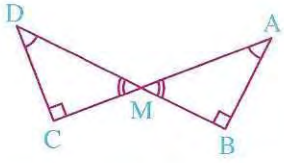

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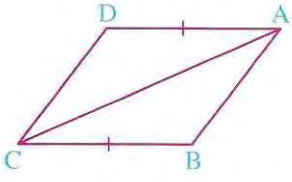

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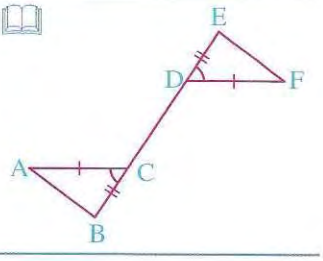

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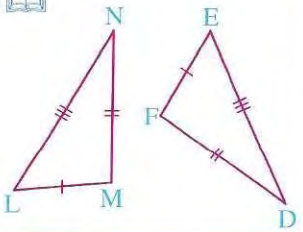

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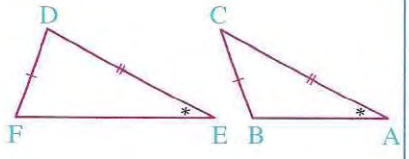

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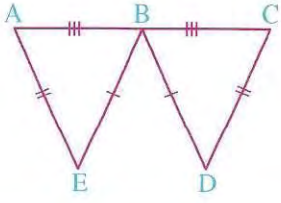

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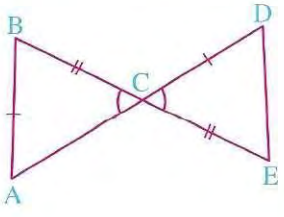

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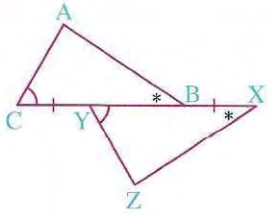

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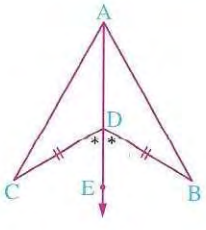

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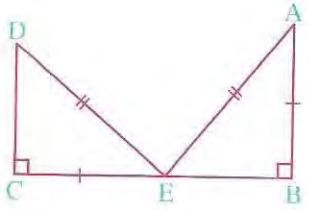

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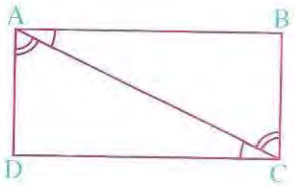

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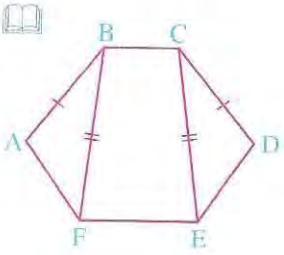
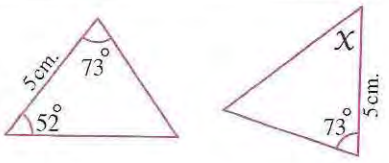


3 **In the opposite figure :**

These triangles are congruent

Complete : x = ...°



4 **In the opposite figure :**

If AB = AD , BC = 7 cm. , m (∠ BAC) = m (∠ DAC) = 25°

and m (∠ B) = 30°

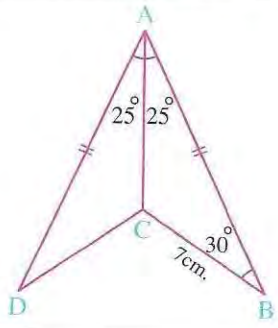
, complete the following :

1 Δ ACB ≡ Δ .....

2 m (∠ D) = ...°

3 CD = ... cm.

4 m (∠ ACD) = ...°

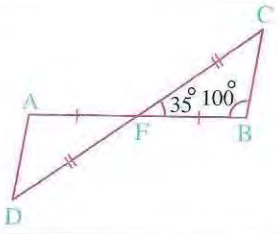


5 **In the opposite figure :**

If $\overline{CD} \cap \overline{BA} = \{F\}$, FA = FB , CF = FD ,

m (∠ CFB) = 35° and m (∠ B) = 100° ,

then complete : m (∠ D) = ...°



6 **In the opposite figure :**

If BC = FD , m (∠ A) = m (∠ E) = 95° ,

m (∠ B) = 35° , m (∠ D) = 50° and FE = 7 cm.

, complete the following :

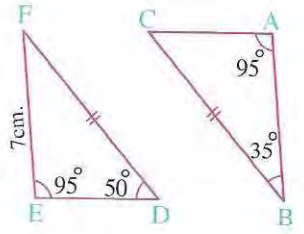
1 m (∠ C) = ...°

2 m (∠ F) = ...°

3 Δ ABC ≡ .....

4 $\overline{AC}$ ≡ .....

5 AB = ... cm.



7 **In the opposite figure :**

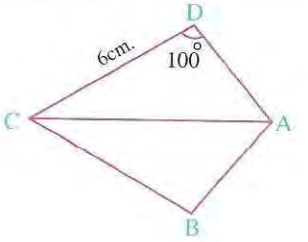
If $\overleftrightarrow{AC}$ bisects ∠ DCB , ∠ DAB , m (∠ D) = 100°

and DC = 6 cm. **, complete the following :**

1 Δ ADC ≡ Δ .....

2 m (∠ B) = ...°

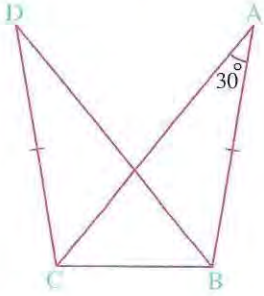
3 BC = ... cm.



8 **In the opposite figure :**

If AB = DC , AC = DB and m (∠ A) = 30°

, complete the following :



1 Δ ABC ≡ Δ .....

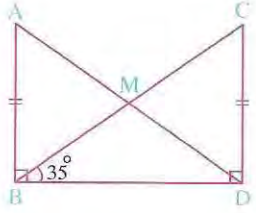
2 m (∠ D) = ...°

3 m (∠ DBC) = m (∠ .....)

9 **In the opposite figure :**

If AB = CD , m (∠ DBC) = 35° ,

$\overline{AB} \perp \overline{BD}$ and $\overline{DC} \perp \overline{DB}$ **, then complete the following :**



1 m (∠ A) = ...°

2 m (∠ ADC) = ...°

3 m (∠ DMB) = ...°

10 **Choose the correct answer from the given ones :**

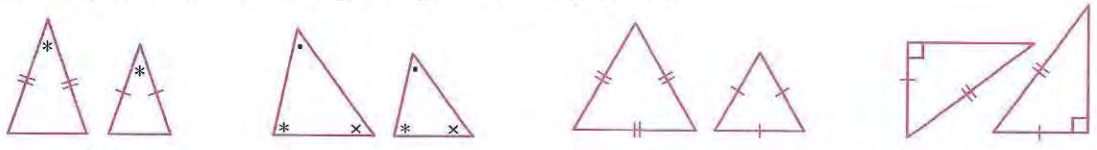
1 The following triangles are congruent except .....

(a) (b) (c) (d)

2 The following triangles are congruent except .....

(a) (b) (c) (d)

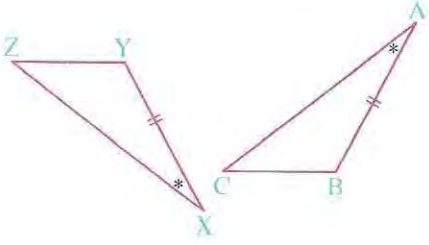
3 Which pair of the following triangles are congruent ?



(a) (b) (c) (d)

4 **In the opposite figure :**

The necessary and enough condition which makes the two triangles ABC and XYZ be congruent is .....



(a) BC = YZ (b) AC = XZ

(c) m (∠ C) = m (∠ Z) (d) m (∠ B) = m (∠ Z)

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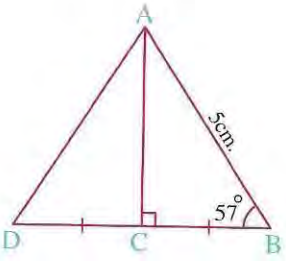
11 **In the opposite figure :**

C is the midpoint of $\overline{BD}$, $\overline{AC} \perp \overline{BD}$,

AB = 5 cm. and m (∠ B) = 57°

Find : 1 The length of $\overline{AD}$

2 m (∠ DAC)



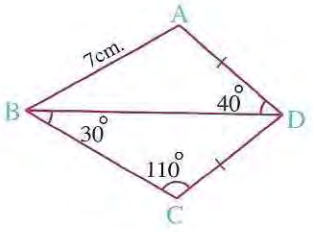
12 **In the opposite figure :**

AD = DC , m (∠ ADB) = 40° , m (∠ DBC) = 30° ,

m (∠ BCD) = 110° and AB = 7 cm.

Find : 1 The length of $\overline{BC}$

2 m (∠ BAD)

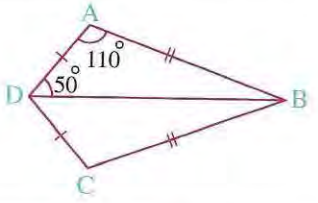


13 **In the opposite figure :**

BA = BC , DA = DC ,

m (∠ ADB) = 50° and m (∠ BAD) = 110°

Find : m (∠ ABC)

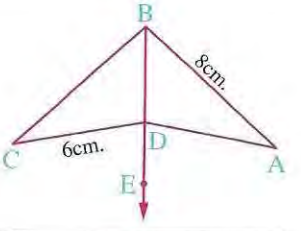


14 **In the opposite figure :**

$\overrightarrow{BE}$ bisects ∠ ADC , ∠ ABC , DC = 6 cm. and AB = 8 cm.

Find : 1 The length of $\overline{CB}$

2 The length of $\overline{AD}$

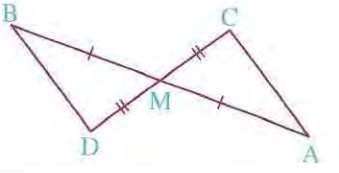


15 **In the opposite figure :**

$\overline{AB} \cap \overline{CD} = \{M\}$, AM = BM

and CM = DM

Is Δ AMC ≡ Δ BMD ? Why ?

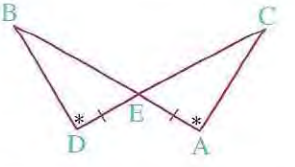


16 **In the opposite figure :**

$\overline{AB} \cap \overline{CD} = \{E\}$, AE = ED and ∠ A ≡ ∠ D

Is Δ ACE ≡ Δ DBE ? Why ?

Then prove that : CE = EB

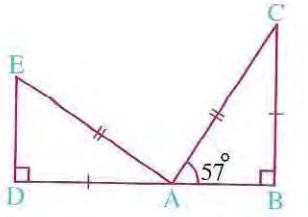


17 **In the opposite figure :**

BC = AD , AC = AE

and m (∠ CAB) = 57°

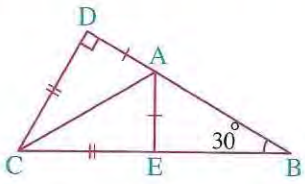
Find the measures of the unknown angles in Δ ADE



18 **In the opposite figure :**

AD = AE , DC = CE , m (∠ ADC) = 90° and m (∠ B) = 30°

Find : m (∠ BAE)

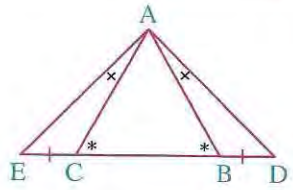


19 **In the opposite figure :**

BD = CE , m (∠ ABC) = m (∠ ACB)

and m (∠ BAD) = m (∠ CAE)

Is AD = AE ? Why ?



20 **Complete each of the following :**

1 If Δ ABC ≡ Δ XYZ , m (∠ A) = 50° and m (∠ B) = 60° , then m (∠ Z) = ...°

2 If Δ ABC ≡ Δ LMN , m (∠ L) = 40° and m (∠ B) = 90° , then m (∠ C) = ...°

3 If Δ ABC ≡ Δ XYZ and m (∠ A) + m (∠ B) = 120° , then m (∠ Z) = ...°

4 If Δ ABC ≡ Δ DEF and m (∠ C) = 90° , then m (∠ D) + m (∠ E) = ...°

5 If Δ ABC ≡ Δ XYZ , m (∠ A) + m (∠ Y) = 100° , then m (∠ C) + m (∠ Z) = ...°

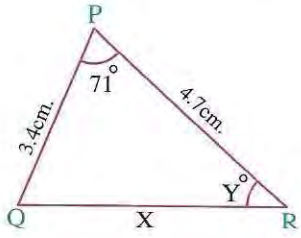
6 If Δ ABC ≡ Δ XYZ , the perimeter of Δ ABC = 12 cm. , XY = 4 cm. and YZ = 5 cm. , then AC = ...

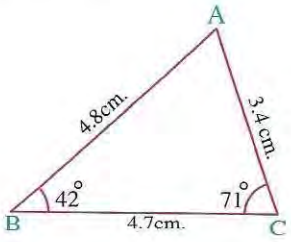
21 a Use a protractor to draw a triangle whose angles have measures 50° , 60° and 70°

b Can you draw another triangle whose angles have measures 50° , 60° and 70° but it is not congruent to the first triangle ?

22 **Study these figures and calculate the values of X and Y :**

1





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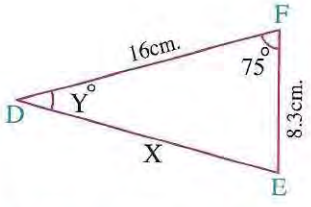

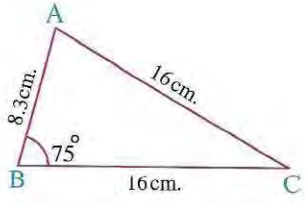

[Hint : The two angles of the base in the isosceles triangle are equal in measure]

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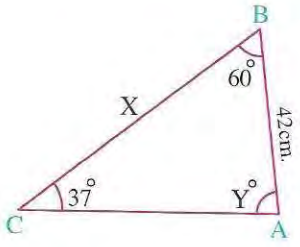
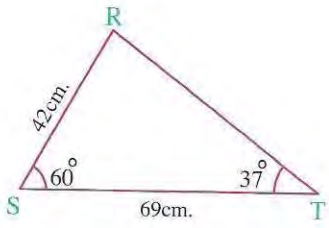
3





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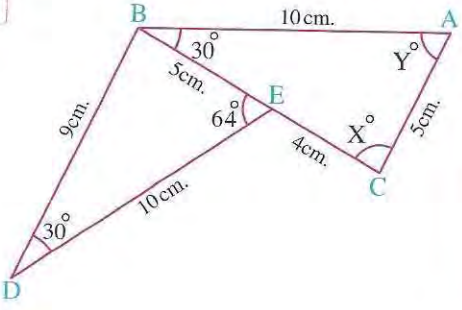

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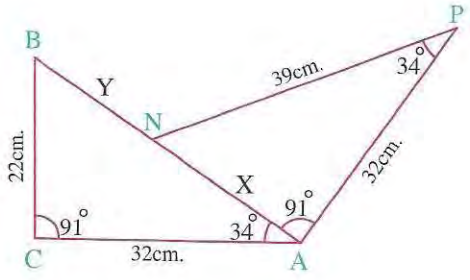


23 **Study the data for Δ ABC and Δ XPG Are these triangles congruent ? Write if applicable , a correct statement of congruence and state the test used.**

1 AB = PX , AC = XG , ∠ A ≡ ∠ X

2 BC = PG , BA = XP , ∠ B ≡ ∠ G

3 AB = PG , BC = PX , AC = XG

4 AB = XP , CA = GX , ∠ B ≡ ∠ P

5 ∠ B ≡ ∠ G , ∠ C ≡ ∠ X , BC = XG

6 ∠ A ≡ ∠ X , ∠ B ≡ ∠ P , AC = PG

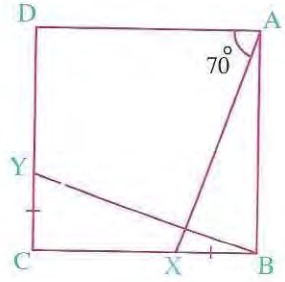
For excellent pupils

24 **In the opposite figure :**

ABCD is a square , BX = CY

and m (∠ XAD) = 70°

Find : m (∠ YBC) with showing the steps of the solution.

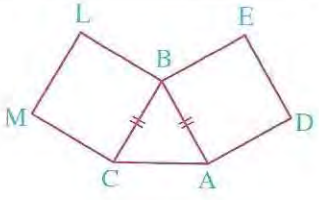


25 **In the opposite figure :**

ABC is an isosceles triangle

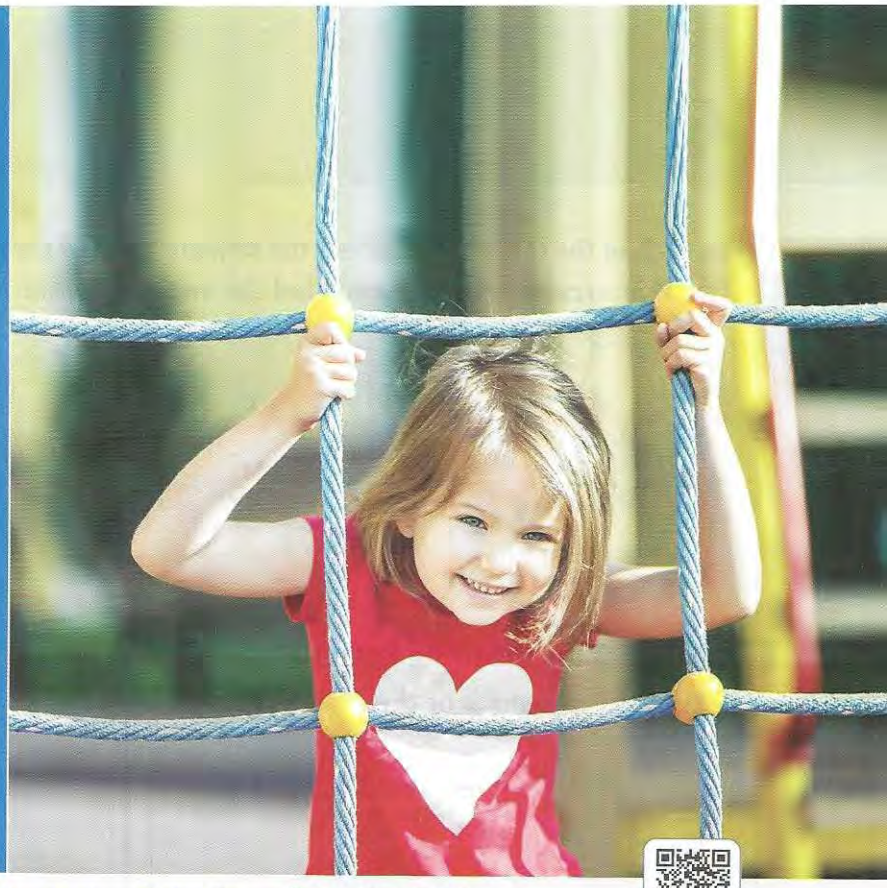
, ABED , CBLM are two squares

Explain that : CE = AL



Exercise **5**

Parallelism



From the school book

● Remember ● Understand ○ Apply Problem Solving

Interactive test

1 Complete the following :

1 The straight line which is perpendicular to one of two parallel straight lines is ..... to the other straight line in the plane.

2 If two straight lines are parallel to a third straight line , then they are .....

3 If two straight lines are perpendicular to a third straight line in the plane , then these two straight lines are .....

4 If a straight line cuts two parallel straight lines , then each two alternate angles are .....

5 If a straight line cuts two parallel straight lines , then each two corresponding angles are .....

6 If a straight line cuts two parallel straight lines , then each two interior angles in the same side of the transversal are .....

7 If a straight line cuts two straight lines and there are two corresponding angles having the same measure , then the two straight lines are .....

8 If a straight line cuts two straight lines and there are two alternate angles having the same measure , then the two straight lines are .....

9 If a straight line cuts two straight lines and there are two interior angles in the same side of the transversal are supplementary , then the two straight lines are .....

10 If a straight line cuts several parallel lines and the intercepted parts of this transversal between these parallel straight lines are equal in length , then the intercepted parts for any transversal are .....

2 **In each of the following figures , the straight line L // the straight line M and the straight line K is a transversal to them. Find the measures of the angles marked by « ? »**

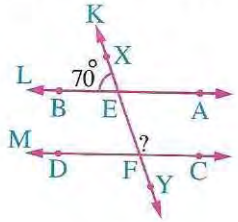


Fig. (1)

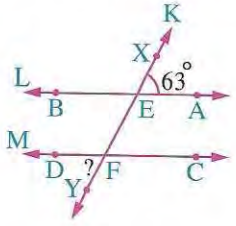


Fig. (2)

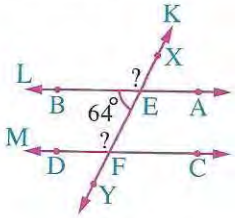


Fig. (3)

3 **In each of the following figures , if $\overrightarrow{AC}$ // $\overrightarrow{BD}$ and $\overrightarrow{AB}$ // $\overrightarrow{DE}$, find the measures of the angles marked by « ? »**

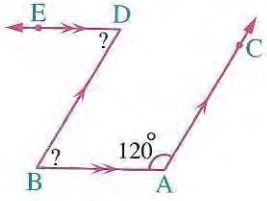


Fig. (1)

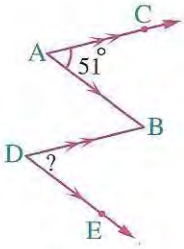


Fig. (2)

4 **Complete , using the data shown in each figure :**

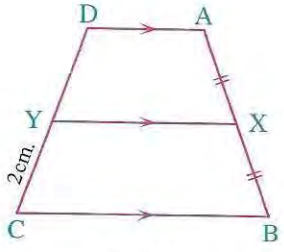


Fig. (1)

DY = ... cm.

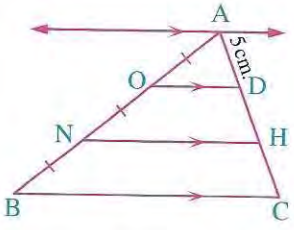


Fig. (2)

AC = ... cm.

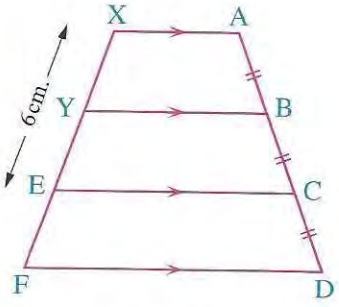


Fig. (3)

YF = ... cm.

5 **In each of the following figures , if $\overleftrightarrow{MN}$ intersects $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ at E and F respectively , prove that : $\overleftrightarrow{AB}$ // $\overleftrightarrow{CD}$**

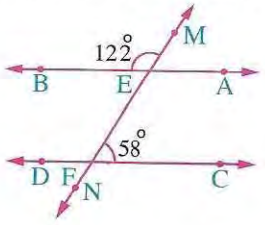


Fig. (1)

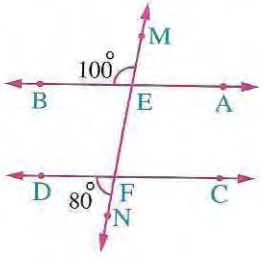


Fig. (2)

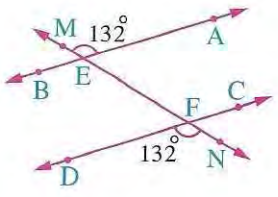


Fig. (3)

6 **In each of the following figures , show with reasons why is $\overline{AD} // \overline{BC}$:**

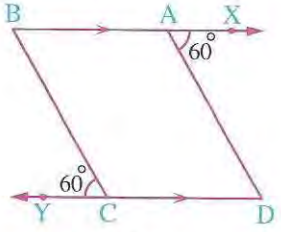


Fig. (1)

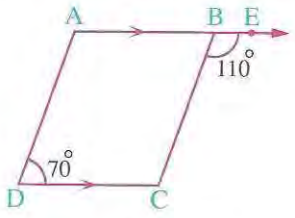


Fig. (2)

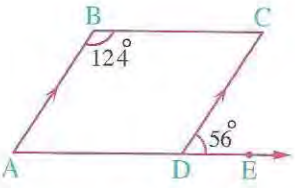


Fig. (3)

7 **Choose the correct answer from those given :**

1 If L_1 and L_2 are two coplanar straight lines where $L_1 \cap L_2 = \varnothing$, then L_1 and L_2 are .....

(a) intersecting. (b) perpendicular.

(c) parallel. (d) coincident.

2 The two straight lines parallel to a third one are .....

(a) perpendicular. (b) coincident.

(c) parallel. (d) intersecting.

3 If L_1 , L_2 and L_3 are three coplanar straight lines , $L_1 \perp L_3$ and $L_2 \perp L_3$, then .....

(a) $L_1 // L_2$ (b) $L_1 \perp L_2$

(c) L_1 is coincides L_2 (d) L_1 intersects L_2

4 If L_1 , L_2 and L_3 are three coplanar straight lines , $L_1 // L_3$ and $L_2 // L_3$, then .....

(a) $L_1 \perp L_2$ (b) $L_1 \perp L_3$ (c) $L_1 // L_2$ (d) $L_2 \perp L_3$

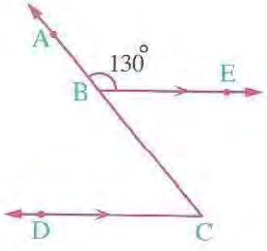
5 If L_1 , L_2 and L_3 are three coplanar straight lines , $L_1 \perp L_2$ and $L_1 // L_3$, then L_2 ..... L_3

(a) $\perp$ (b) // (c) coincides (d) bisects

6 **In the opposite figure :**

$B \in \overline{AC}$, $\overrightarrow{BE} // \overrightarrow{CD}$ and m ($\angle$ ABE) = 130°

, then m ($\angle$ C) = ...



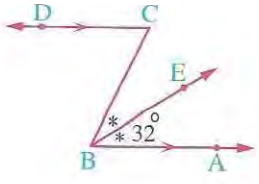
(a) 130° (b) 40°

(c) 50° (d) 90°

7 **In the opposite figure :**

$\overrightarrow{BE}$ bisects $\angle$ ABC , $\overrightarrow{BA} // \overrightarrow{CD}$ and

m ($\angle$ ABE) = 32° , then m ($\angle$ C) = ...



(a) 32° (b) 64°

(c) 60° (d) 80°

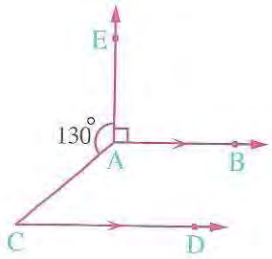
8 **In the opposite figure :**

$\overrightarrow{AB} // \overrightarrow{CD}$, m (∠ EAC) = 130°

and m (∠ EAB) = 90° , then m (∠ C) = ...

(a) 90° (b) 130°

(c) 140° (d) 40°



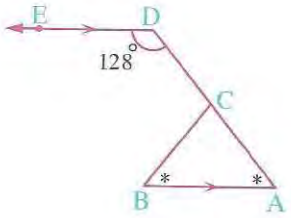
9 **In the opposite figure :**

$\overrightarrow{AB} // \overrightarrow{DE}$, m (∠ D) = 128°,

m (∠ A) = m (∠ B) and C ∈ $\overrightarrow{AD}$, then m (∠ B) = ...

(a) 64° (b) 128°

(c) 52° (d) 26°



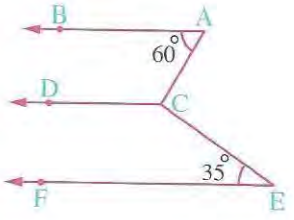
10 **In the opposite figure :**

$\overrightarrow{AB} // \overrightarrow{CD}$, $\overrightarrow{AB} // \overrightarrow{EF}$, m (∠ A) = 60° and

m (∠ E) = 35° , then m (∠ ACE) = ...

(a) 60° (b) 35°

(c) 95° (d) 85°



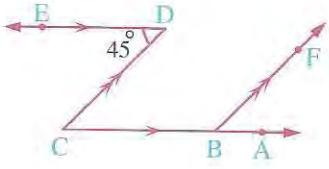
11 **In the opposite figure :**

m (∠ D) = 45° , $\overrightarrow{DE} // \overrightarrow{CA}$ and

$\overrightarrow{CD} // \overrightarrow{BF}$, then m (∠ ABF) = ...

(a) 45° (b) 90°

(c) 135° (d) 40°



12 **In the opposite figure :**

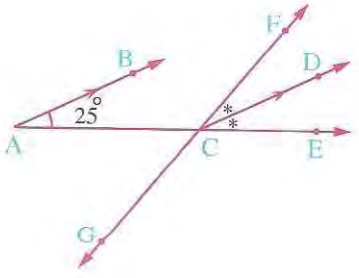
$\overrightarrow{FG} \cap \overrightarrow{AE} = \{C\}$, $\overrightarrow{CD}$ bisects ∠ FCE ,

$\overrightarrow{CD} // \overrightarrow{AB}$ and m (∠ A) = 25°

, then m (∠ GCA) = ...

(a) 25° (b) 50°

(c) 130° (d) $12\frac{1}{2}^{\circ}$



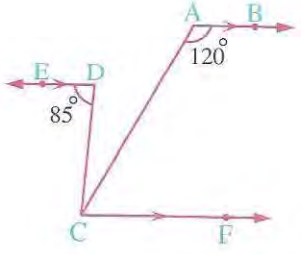
13 **In the opposite figure :**

$\overrightarrow{AB} // \overrightarrow{CF} // \overrightarrow{DE}$, m (∠ A) = 120°

and m (∠ D) = 85° , then m (∠ ACD) = ...

(a) 60° (b) 85°

(c) 25° (d) 120°



14 **In the opposite figure :**

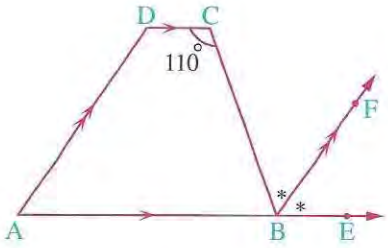
$\overline{CD} \parallel \overrightarrow{AB}$, m ($\angle$ C) = 110° ,

$\overline{AD} \parallel \overrightarrow{BF}$ and $\overrightarrow{BF}$ bisects $\angle$ CBE

where E $\in \overleftrightarrow{AB}$, then m ($\angle$ A) = ...

(a) 55° (b) 110°

(c) 70° (d) 160°

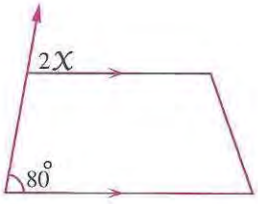


15 **In the opposite figure :**

What is the value of x ?

(a) 40° (b) 60°

(c) 80° (d) 100°

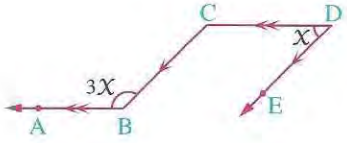


16 **In the opposite figure :**

$\overline{CD} \parallel \overrightarrow{BA}$, $\overrightarrow{DE} \parallel \overrightarrow{CB}$, then x = ...

(a) 60° (b) 45°

(c) 120° (d) 90°



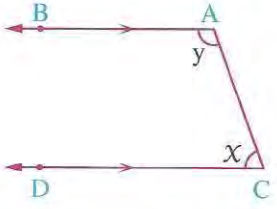
17 **In the opposite figure :**

If $\overrightarrow{AB} \parallel \overrightarrow{CD}$ and $\frac{x}{y} = \frac{7}{11}$

, then x = ...

(a) 60° (b) 70°

(c) 100° (d) 110°

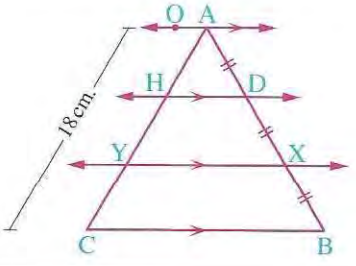


8 **In the opposite figure :**

$\overleftrightarrow{AO} \parallel \overleftrightarrow{HD} \parallel \overleftrightarrow{YX} \parallel \overline{CB}$, AD = DX = XB

and AC = 18 cm.

Find the length of $\overline{AY}$

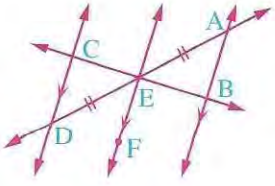


9 **In the opposite figure :**

$\overleftrightarrow{AD} \cap \overleftrightarrow{BC} = \{E\}$, $\overrightarrow{AB} \parallel \overleftrightarrow{EF} \parallel \overleftrightarrow{CD}$, AE = DE

and BC = 8 cm.

Find the length of $\overline{BE}$

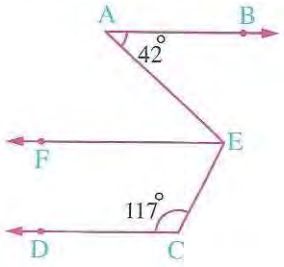


10 **In the opposite figure :**

$\overrightarrow{AB} // \overrightarrow{CD}$, $\overrightarrow{EF} // \overrightarrow{CD}$

, m (∠ A) = 42° and m (∠ C) = 117°

Find : m (∠ AEC)

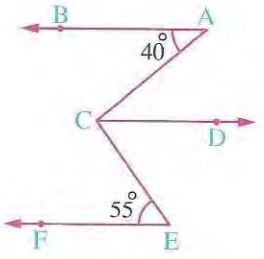


11 **In the opposite figure :**

m (∠ A) = 40° , m (∠ E) = 55°

, $\overrightarrow{AB} // \overrightarrow{EF}$ and $\overrightarrow{AB} // \overrightarrow{CD}$

Find : m (∠ ACE)

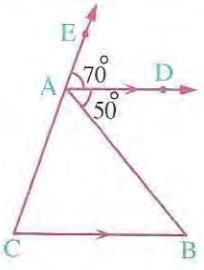


12 **In the opposite figure :**

$\overrightarrow{AD} // \overrightarrow{BC}$, $E \in \overrightarrow{CA}$,

m (∠ DAE) = 70° and m (∠ DAB) = 50°

Find the measures of the angles of the triangle ABC

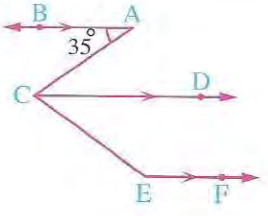


13 **In the opposite figure :**

$\overrightarrow{AB} // \overrightarrow{CD} // \overrightarrow{EF}$, m (∠ A) = 35° and

$\overrightarrow{CD}$ bisects ∠ ACE

Find : 1 m (∠ DCE) 2 m (∠ CEF)

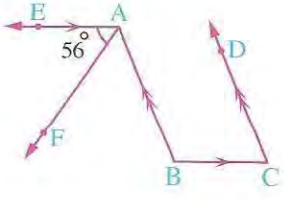


14 **In the opposite figure :**

$\overrightarrow{AE} // \overrightarrow{CB}$, $\overrightarrow{BA} // \overrightarrow{CD}$,

$\overrightarrow{AF}$ bisects ∠ BAE and m (∠ EAF) = 56°

Find : m (∠ C)

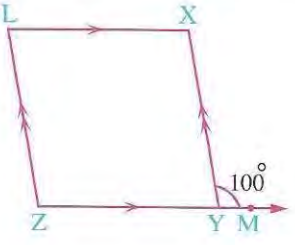


15 **In the opposite figure :**

$\overline{XL} // \overline{YZ}$, $\overline{XY} // \overline{LZ}$ and m (∠ XYM) = 100°

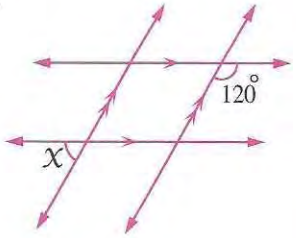
, where $M \in \overrightarrow{ZY}$

Find : 1 m (∠ X) 2 m (∠ Z) 3 m (∠ L)

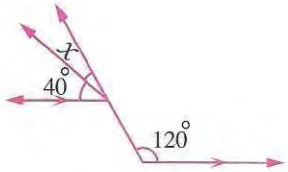


16 **Find the value of x in each figure :**

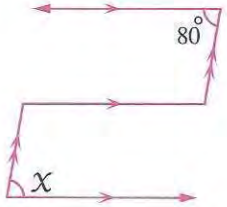
1



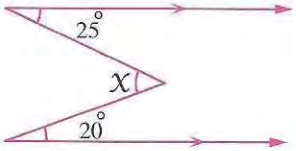
2



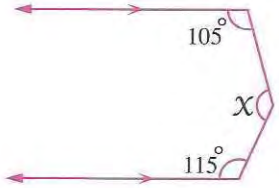
3



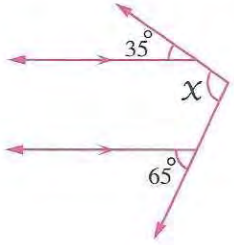
4



5



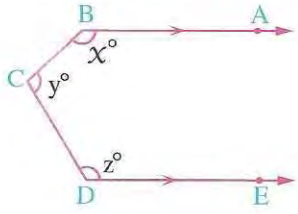
6



17 **In In the opposite figure :**

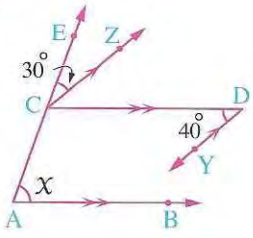
$\overrightarrow{BA} // \overrightarrow{DE}$

Find the value of the expression : $x + y + z$



18 **Find the value of x in each of the following figures :**

1



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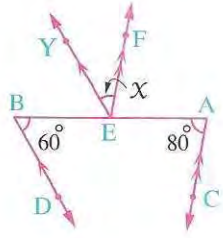

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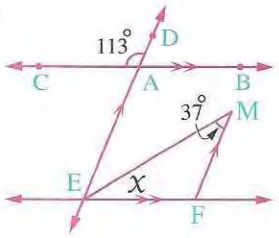

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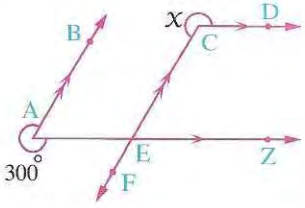

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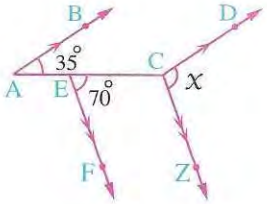

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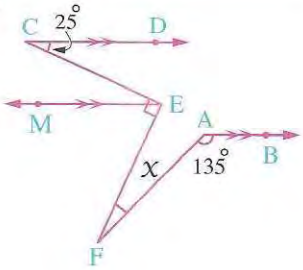
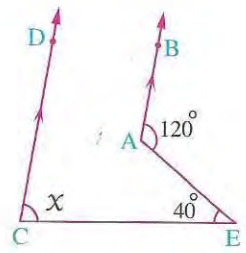


● Remember ● Understand ○ Apply Problem Solving

7



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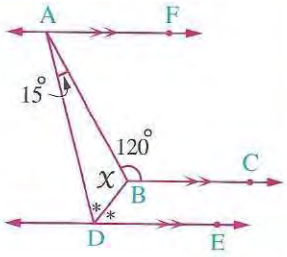

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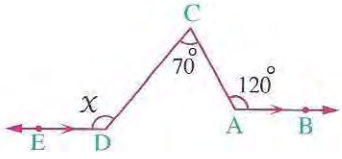
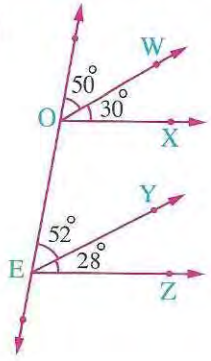
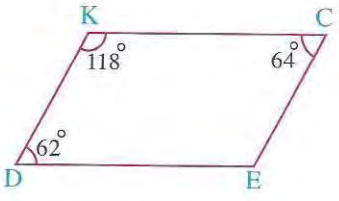


19 **Find the pairs of parallel lines in each figure :**

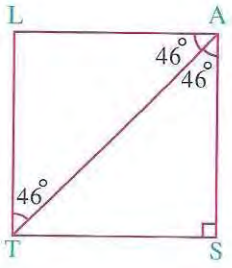
1



2



3

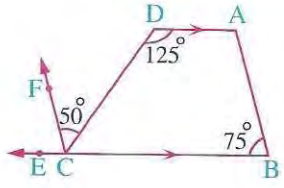


20 **In the opposite figure :**

$\overline{AD} \parallel \overrightarrow{BC}$, $E \in \overrightarrow{BC}$,

m (∠ B) = 75° , m (∠ D) = 125° and

m (∠ DCF) = 50° Is $\overleftrightarrow{AB} \parallel \overrightarrow{CF}$? Why ?

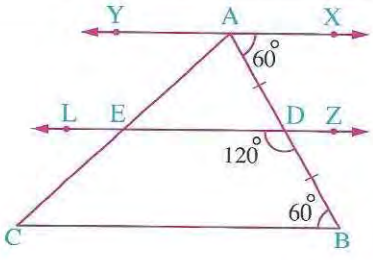


21 **In the opposite figure :**

m (∠ XAD) = m (∠ B) = 60°

, m (∠ EDB) = 120° , AD = DB and AC = 18 cm.

Find the length of $\overline{AE}$ giving the reason.

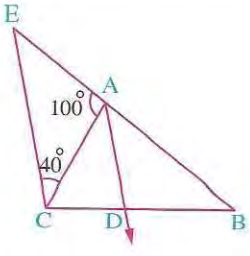


22 **In the opposite figure :**

$A \in \overline{BE}$, $\overrightarrow{AD}$ bisects ∠ BAC

, m (∠ EAC) = 100° and m (∠ ACE) = 40°

Is $\overrightarrow{AD} \parallel \overline{CE}$? Why ?

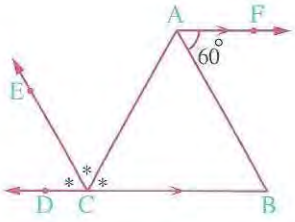


23 **In the opposite figure :**

$m(\angle FAB) = 60°$, $\overrightarrow{AF} // \overrightarrow{BD}$,

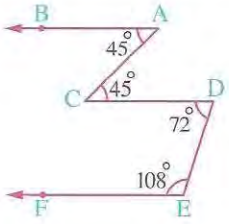
$C \in \overline{BD}$ and $m(\angle ACB) = m(\angle ACE) = m(\angle ECD)$

Is $\overline{AB} // \overrightarrow{CE}$? Why ?



24 **In the opposite figure :**

Is $\overrightarrow{AB} // \overline{DC} // \overrightarrow{EF}$? Why ?



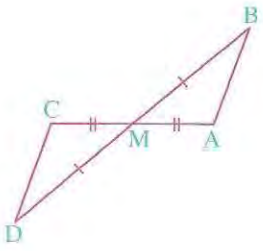
25 **In the opposite figure :**

$\overline{BD} \cap \overline{AC} = \{M\}$

, $MB = MD$ and $MA = MC$

1 Is $\Delta AMB \equiv \Delta CMD$? Why ?

2 Is $\overline{AB} // \overline{CD}$? Why ?

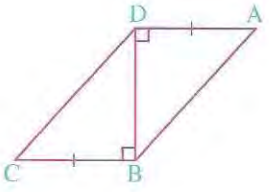


26 **In the opposite figure :**

ABCD is a quadrilateral in which

$AD = CB$ and $m(\angle ADB) = m(\angle CBD) = 90°$

Is $\overline{AB} // \overline{CD}$? Why ?

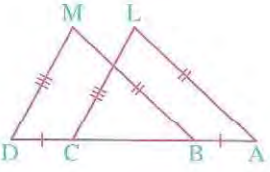


27 **In the opposite figure :**

$B \in \overline{AD}$ and $C \in \overline{AD}$

such that : $AB = CD$, $AL = BM$ and $LC = MD$

Is $\overline{AL} // \overline{BM}$, $\overline{CL} // \overline{DM}$? Why ?

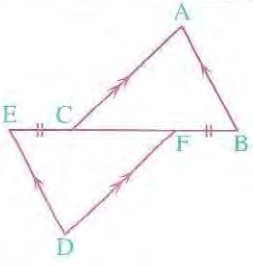


28 **In the opposite figure :**

$\overline{AB} // \overline{ED}$, $\overline{AC} // \overline{FD}$

and $\overline{BF} \equiv \overline{CE}$

Is $\overline{AB} \equiv \overline{DE}$? Why ?

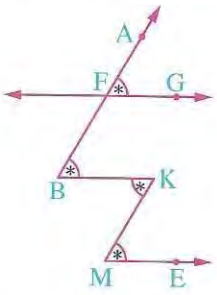


29 **In the opposite figure :**

$m(\angle AFG) = m(\angle B) = m(\angle K) = m(\angle M)$

Write the four pairs of parallel lines.

Give your reasons.



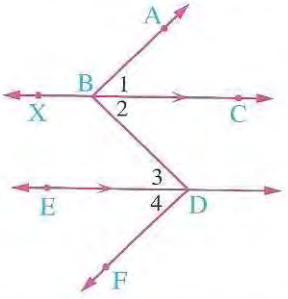
30 **In the opposite figure :**

$m(\angle 1) = m(\angle 4)$

and $\overleftrightarrow{BC} // \overleftrightarrow{ED}$

Does $\overleftrightarrow{BA} // \overleftrightarrow{DF}$?

Give reason.

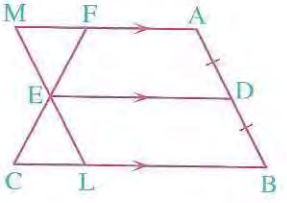


31 **In the opposite figure :**

$\overleftrightarrow{AM} // \overleftrightarrow{DE} // \overleftrightarrow{BC}$, $AD = DB$, $F \in \overline{AM}$

, $L \in \overline{BC}$, $\overline{ML} \cap \overline{FC} = \{E\}$

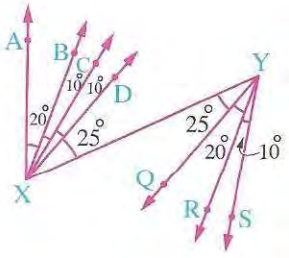
Is $FM = LC$? Why ?



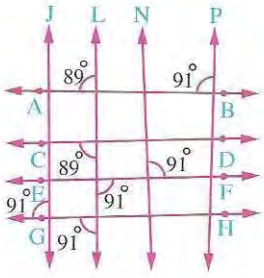
For excellent pupils

32 **In each of the following figures , name the pairs of parallel lines :**

1



2

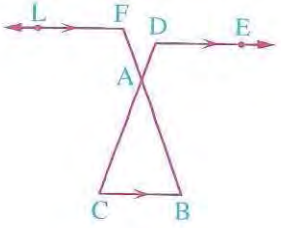


33 **In the opposite figure :**

If $\overline{DE} // \overline{BC} // \overline{FL}$

, $m(\angle D) + m(\angle F) = 220°$

Find : $m(\angle BAC)$



Test 1

Total mark 10

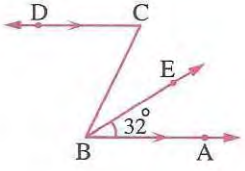
1 Choose the correct answer from the given ones : (3 marks)

1 **In the opposite figure :**

$\overrightarrow{BE}$ bisects $\angle ABC$, $\overrightarrow{BA} // \overrightarrow{CD}$

and m ($\angle ABE$) = 32°

, then m ($\angle C$) = ...



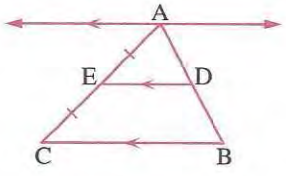
(a) 32° (b) 64° (c) 60° (d) 80°

2 If $\Delta ABC \equiv \Delta XYZ$, m ($\angle X$) + m ($\angle Y$) = 140° , then m ($\angle C$) = ...

(a) 180° (b) 140° (c) 90° (d) 40°

3 **In the opposite figure :**

AD : AB = ...



(a) 1 : 1 (b) 1 : 2

(c) 1 : 3 (d) 1 : 4

---

2 Complete the following : (3 marks)

1 If two straight lines are perpendicular to a third straight line , then the two straight lines are .....

2 The diagonal of the rectangle divides its surface into two ..... triangles.

3 Any two right-angled triangles are congruent if .....

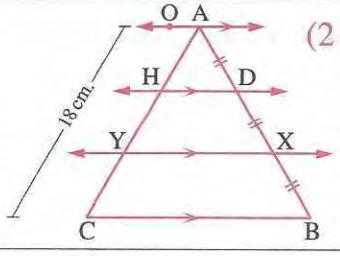
---

3 In the opposite figure : (2 marks)

$\overleftrightarrow{AO} // \overleftrightarrow{HD} // \overleftrightarrow{YX} // \overline{CB}$

, AD = DX = XB and AC = 18 cm.

Find the length of : $\overline{AY}$



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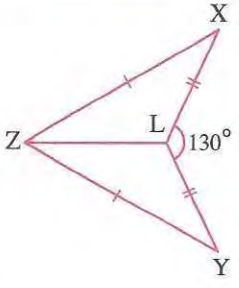
4 In the opposite figure : (2 marks)

YZ = XZ , XL = YL

, m ($\angle XLY$) = 130°

Prove that : $\Delta XLZ \equiv \Delta YLZ$

, then find : m ($\angle XLZ$)



Test 2

Total mark: 10

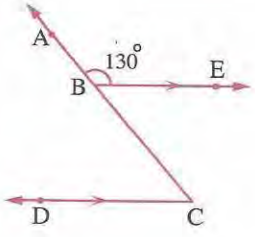
1 Choose the correct answer from the given ones : (3 marks)

1 **In the opposite figure :**

$B \in \overline{AC}$, $\overrightarrow{BE} // \overrightarrow{CD}$

and m ($\angle$ ABE) = 130°

, then m ($\angle$ C) = ...



(a) 130° (b) 40°

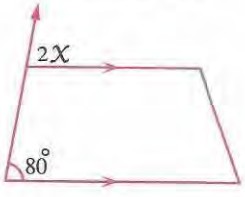
(c) 50° (d) 90°

2 If L_1 and L_2 are two coplanar straight lines where $L_1 \cap L_2 = \varnothing$, then L_1 and L_2 are .....

(a) intersecting. (b) perpendicular. (c) parallel. (d) coincident.

3 **In the opposite figure :**

What is the value of x ?



(a) 40° (b) 60°

(c) 80° (d) 100°

2 Complete the following : (3 marks)

1 If $\Delta ABC \equiv \Delta XYZ$, then AB – XY = ...

2 If $\Delta CDE \equiv \Delta LMN$, the perimeter of ΔCDE = 12 cm. , LM = 4 cm. , MN = 5 cm. , then LN = ...

3 The straight line which is perpendicular to one of two parallel straight lines is ..... to the other straight line in the plane.

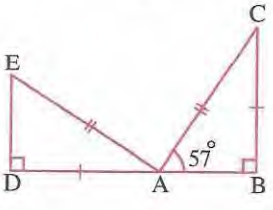
3 In the opposite figure : (2 marks)

BC = AD , AC = AE

, m ($\angle$ B) = m ($\angle$ D) = 90°

and m ($\angle$ CAB) = 57°

Find the measures of the unknown angles in Δ ADE

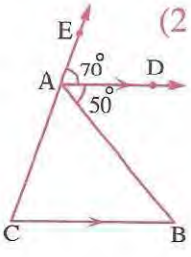


4 In the opposite figure : (2 marks)

$\overrightarrow{AD} // \overrightarrow{BC}$, $E \in \overrightarrow{CA}$

, m ($\angle$ DAE) = 70° and m ($\angle$ DAB) = 50°

Find the measures of the angles of the triangle ABC



Test 1

Total mark 10

1 Choose the correct answer from those given : (3 marks)

1 $7x^2 - 2x^2 =$ .....

ⓐ 5 ⓑ $5x^2$ ⓒ $5x$ ⓓ $9x^2$

2 The algebraic term b^3 = ...

ⓐ $3 \times b \times b$ ⓑ $b + b + b$ ⓒ $b \times b \times b$ ⓓ $3 \times b$

3 If $5a = 45$ and $ba = 1$, then b = ...

ⓐ $\frac{1}{45}$ ⓑ $\frac{1}{9}$ ⓒ $\frac{1}{5}$ ⓓ 9

2 Complete the following : (3 marks)

1 The number that lies half the way between $\frac{1}{2}$, $\frac{3}{4}$ is .....

2 The result of subtracting $-3x^2$ from $5x^2$ is .....

3 $\frac{4y^5}{y^3} + 2y^2 =$ ..... where $y \neq 0$

3 Using the distribution property , find the value of : (2 marks)

$\frac{3}{7} \times 9 + \frac{3}{7} \times 6 - \frac{3}{7}$

4 Subtract : $5x^2 + y^2 - 3xy$ from $3xy + 5x^2 + y^2$ (2 marks)

Test 2

Total mark 10

1 Choose the correct answer from those given : (3 marks)

1 If the algebraic expression : $a x^3 + 5 x^2 + 7 x - 9$ is of the second degree , then a = ...

(a) 1 (b) 3 (c) – 2 (d) zero

2 a + a + a = ...

(a) $3 a^2$ (b) 3 a (c) a^3 (d) a + 3

3 If the area of a rectangle is $24 x^3$ and its length is $8 x^2$, then its width is .....

(a) $3 x^5$ (b) $3 x$ (c) $3 x^2$ (d) 3

2 Complete the following : (3 marks)

1 $3 x$ decreases $5 x$ by .....

2 The degree of the absolute term in any algebraic expression is .....

3 $\frac{-4}{5} \times$ ..... = 1

3 If $a = \frac{1}{2}$, $b = \frac{2}{5}$, $c = \frac{1}{5}$ (2 marks)

, find the numerical value of the expression : $(a + b) \div c$

4 Add $3 x^2 + 2 x y - 5$ and $- 2 x^2 - 3 x y + x$ (2 marks)

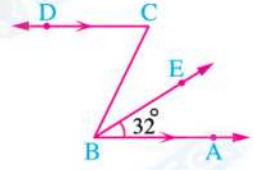
, then find the numerical value of the result when : $x = -1$ and $y = 2$

Test 1

Total mark 10

1 Choose the correct answer from those given : (3 marks)

1 In the opposite figure :



$\overrightarrow{BE}$ bisects $\angle ABC$, $\overrightarrow{BA} // \overrightarrow{CD}$

and $m(\angle ABE) = 32°$

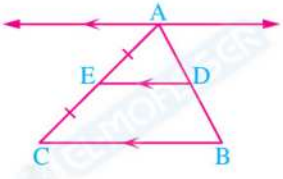
, then $m(\angle C)$ = ...

(a) 32° (b) 64° (c) 60° (d) 80°

2 If $\Delta ABC \equiv \Delta XYZ$, $m(\angle X) + m(\angle Y) = 140°$, then $m(\angle C)$ = ...

(a) 180° (b) 140° (c) 90° (d) 40°

3 In the opposite figure :



AD : AB = ...

(a) 1 : 1 (b) 1 : 2

(c) 1 : 3 (d) 1 : 4

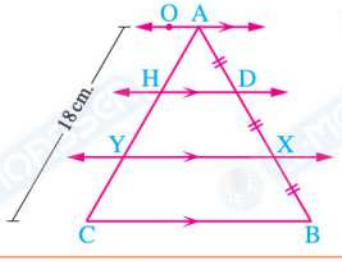
2 Complete the following : (3 marks)

1 If two coplanar straight lines are perpendicular to a third one , then the two straight lines are .....

2 The diagonal of the rectangle divides its surface into two ..... triangles.

3 Any two right-angled triangles are congruent if .....

3 In the opposite figure : (2 marks)

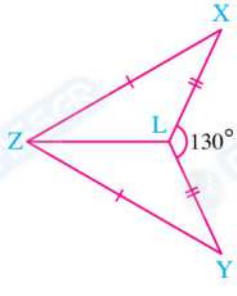


$\overleftrightarrow{AO} // \overleftrightarrow{HD} // \overleftrightarrow{YX} // \overline{CB}$

, AD = DX = XB and AC = 18 cm.

Find the length of : $\overline{AY}$

4 In the opposite figure : (2 marks)



YZ = XZ , XL = YL

, $m(\angle XLY) = 130°$

Prove that : $\Delta XLZ \equiv \Delta YLZ$

, then find : $m(\angle XLZ)$

Test 2

Total mark 10

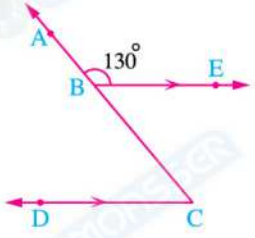
1 Choose the correct answer from those given : (3 marks)

1 **In the opposite figure :**

$B \in \overline{AC}$, $\overrightarrow{BE} // \overrightarrow{CD}$

and m ($\angle$ ABE) = 130°

, then m ($\angle$ C) = ...



(a) 130° (b) 40°

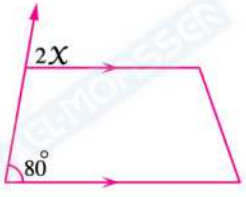
(c) 50° (d) 90°

2 If L_1 and L_2 are two coplanar straight lines where $L_1 \cap L_2 = \varnothing$, then L_1 and L_2 are .....

(a) intersecting. (b) perpendicular. (c) parallel. (d) coincident.

3 **In the opposite figure :**

What is the value of x ?



(a) 40° (b) 60°

(c) 80° (d) 100°

2 Complete the following : (3 marks)

1 If $\Delta ABC \equiv \Delta XYZ$, then AB – XY = ...

2 If $\Delta CDE \equiv \Delta LMN$, the perimeter of ΔCDE = 12 cm. , LM = 4 cm. , MN = 5 cm.

, then LN = ...

3 The straight line which is perpendicular to one of two parallel straight lines is ..... to the other straight line in the plane.

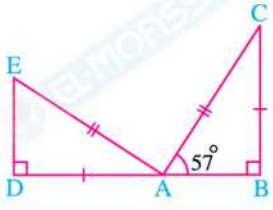
3 In the opposite figure : (2 marks)

BC = AD , AC = AE

, m ($\angle$ B) = m ($\angle$ D) = 90°

and m ($\angle$ CAB) = 57°

Find the measures of the unknown angles in Δ ADE

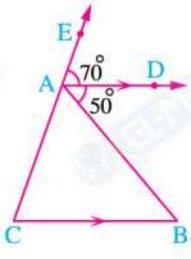


4 In the opposite figure : (2 marks)

$\overrightarrow{AD} // \overrightarrow{BC}$, $E \in \overrightarrow{CA}$

, m ($\angle$ DAE) = 70° and m ($\angle$ DAB) = 50°

Find the measures of the angles of the triangle ABC



Answers of Test 1

1 1 (b) 2 (c) 3 (b)

2 1 $\frac{5}{8}$ or 0.625 2 $8x^2$ 3 $6y^2$

3 $\frac{3}{7} \times [9 + 6 - 1] = \frac{3}{\cancel{7}_{1}} \times \cancel{14}^{2} = 6$

4
$$\begin{array}{r} 3xy + \cancel{5x^2} + \cancel{y^2} \\ \oplus \quad \ominus \quad \ominus \\ -3xy + \cancel{5x^2} + \cancel{y^2} \\ \hline 6xy \end{array}$$

Answers of Test 2

1 1 (d) 2 (b) 3 (b)

2 1 $2x$ 2 zero 3 $\frac{-5}{4}$ or $-1\ \frac{1}{4}$

3 $\left(\frac{1}{2} + \frac{2}{5}\right) \div \frac{1}{5} = \left(\frac{5}{10} + \frac{4}{10}\right) \div \frac{1}{5} = \frac{9}{10} \div \frac{1}{5} = \frac{9}{\cancel{10}_{2}} \times \frac{\cancel{5}^{1}}{1} = \frac{9}{2}$

4
$$\begin{array}{r} 3x^2 + 2xy \quad -5 \\ -2x^2 - 3xy + x \\ \hline \end{array}$$

The sum $= x^2 - xy + x - 5$

, the numerical value $= (-1)^2 - (-1) \times 2 + (-1) - 5 = 1 + 2 - 1 - 5 = -3$

Answers of Test 1

1 1 (b) 2 (d) 3 (b)

2 1 parallel 2 congruent

3 the hypotenuse and a side of one triangle are congruent to the corresponding parts of the other triangle.

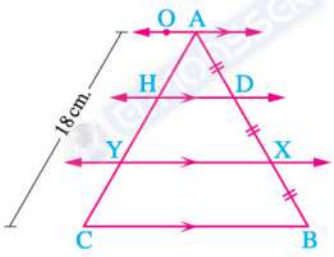
3 Since : $\overleftrightarrow{AO} // \overleftrightarrow{HD} // \overleftrightarrow{YX} // \overline{CB}$

, $\overleftrightarrow{AB}$ and $\overleftrightarrow{AC}$ are two transversals to them.

, AD = DX = XB

, then : $AH = HY = YC = \frac{18}{3} = 6$ cm.

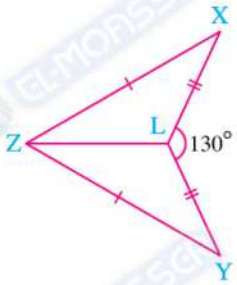
, then : AY = 12 cm.



4 $\Delta XLZ \equiv \Delta YLZ$

because $\begin{cases} XL = YL \\ XZ = YZ \\ \overline{LZ} \text{ is a common side} \end{cases}$

, then : $m(\angle XLZ) = m(\angle YLZ) = \frac{360° - 130°}{2} = 115°$



Answers of Test 2

1 1 (c) 2 (c) 3 (a)

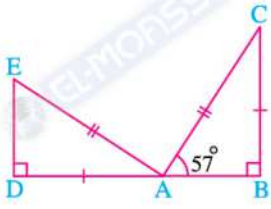
2 1 zero 2 3 cm. 3 perpendicular

3 From ΔABC : $m(\angle ACB) = 180° - (90° + 57°) = 33°$

$\Delta ABC \equiv \Delta EDA$ (Hypotenuse and one side).

, $m(\angle E) = m(\angle BAC) = 57°$

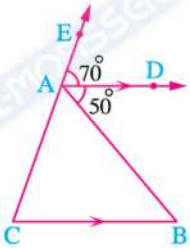
, $m(\angle EAD) = m(\angle ACB) = 33°$



4 $m(\angle B) = m(\angle DAB) = 50°$ (alternate angles)

$m(\angle C) = m(\angle EAD) = 70°$ (corresponding angles)

$m(\angle BAC) = 180° - (50° + 70°) = 60°$



Model 1

First: Choose the correct answer:

1. The number that has no multiplicative inverse is .....

   (a) 1 (b) zero (c) −1 (d) 2

2. 4x increases (−4x) by .....

   (a) 8x (b) zero (c) −8x (d) 16x

3. The number that lies at half distance between $\frac{1}{3}$ and $\frac{5}{9}$ is .....

   (a) $\frac{2}{3}$ (b) $\frac{3}{4}$ (c) $\frac{4}{5}$ (d) $\frac{4}{9}$

Second: Complete:

1. $4a^2b -$ ..... $= 8a^2b$
2. The coefficient of the algebraic term $-3x^2$ is .....
3. $\frac{5}{6}$ x ..... = 1

Third: Answer the following:

1. Use the Distribution Property to find the value of:

   $\frac{5}{17} \times 10 + \frac{5}{17} \times 23 + \frac{5}{17}$

   .....

   .....

   .....

2. Find the rational number lying at:

   One fourth of the way between $\frac{5}{7}$ and $\frac{-3}{7}$ *(from the greater side)*

   .....

   .....

   .....

   .....

Model 2

First: Choose the correct answer:

1. If $\frac{2}{3}$ lies at the middle of the way between x and $\frac{1}{2}$, then x = ...

   a) $\frac{1}{3}$ b) $\frac{3}{5}$ c) $\frac{5}{6}$ d) $\frac{7}{8}$

2. The additive inverse of "X – 5" is .....

   a) – 5 – x b) – x + 5 c) 5 d) x – 5

3. If $\frac{2}{5}x = 10$, then $\frac{1}{5}x$ = ...

   a) 1 b) zero c) 4 d) 5

Second: Complete:

1. 3a + 4b decreases 5b + 3a by .....
2. The degree of the absolute term in any algebraic expression is .....
3. $2\frac{1}{5}$ x ..... = 1

Third: Answer the following:

1. Subtract: $5x^2 - 4x + 13$ from $3x^2 + 4x$

.....

.....

2. Use the Distribution Property to find the value of:

   $\frac{4}{9} \times 10 + \frac{4}{9} \times 16 + \frac{4}{9}$

.....

.....

.....

Model 3

First: Choose the correct answer:

1. If $\frac{a}{b} = 1$, then $2a - 2b =$ .....

   (a) 3 (b) 2 (c) 1 (d) 0

2. The algebraic term b^3 = ...

   (a) 3 x b x b (b) b + b + b (c) b x b x b (d) 3 x b

3. The result of subtracting 7a from 15a – 4 is .....

   (a) –8 a + 4 (b) 8 a + 4

   (c) 8 a – 4 (d) –22 a – 4

Second: Complete:

1. If the algebraic term: $4xy^{k-1}$ is of the fifth degree, then k =.....
2. The multiplicative inverse of the rational number $-\frac{3}{5}$ is .....
3. If $5x^m + 2x^n = 7x^6$, then m + n = ...

Third: Answer the following:

1. What is the expression that should be subtracted from:

   $-x^2 + 2x - 1$ to get $3x^2 - 5$

   .....

   .....

2. Find the rational number lying at:

   One fourth of the way between $\frac{1}{3}$ and 1 *(from the smaller side)*

   .....

   .....

   .....

Model 4

First: Choose the correct answer:

1. If $5a = 45$ and $b\,a = 1$, then $b =$ .....

   (a) $\frac{1}{45}$ (b) $\frac{1}{9}$ (c) $\frac{1}{5}$ (d) 9

2. If $\frac{x}{y} = \frac{4}{5}$, then $\frac{5x}{4y} =$ .....

   (a) $\frac{4}{5}$ (b) $\frac{5}{4}$ (c) $\frac{25}{16}$ (d) 1

3. The algebraic term "$4\,a^2\,y^2$" is of the ..... degree.

   (a) second (b) third (c) fourth (d) fifth

Second: Complete:

1. The multiplicative inverse of the number $(\frac{-5}{7})^0$ is .....
2. The rational number that lies at the third of the way between 8 and 12 from the side of the smaller number is .....
3. The result of subtracting "$-3\,a^2$" from "$5\,a^2$" is .....

Third: Answer the following:

1. If $x = -\frac{1}{3}$, $y = \frac{3}{4}$, and $z = -3$, then find the numerical value of each of the following:

   (a) $x\,y\,z$ (b) $xy + yz$

   .....

   .....

2. What the increase of $x^2 - 5x - 1$ than $3x^2 - 3x - 3$

   .....

   .....

   .....

Model 5

First: Choose the correct answer:

1. $(\frac{2}{7} + \frac{3}{5})$ is the multiplicative inverse of .....

   (a) $-\frac{5}{12}$ (b) $\frac{12}{5}$ (c) $\frac{31}{35}$ (d) $\frac{35}{31}$

2. If $\frac{3}{7}x = 42$, then $\frac{5}{7}x =$ .....

   (a) 70 (b) 45 (c) 30 (d) 10

3. If the algebraic term: $9 x y^n$ is of the third degree, then n = ...

   (a) 1 (b) 2 (c) 3 (d) 4

Second: Complete:

1. If the degree of the algebraic term y^{2m} is the degree of the algebraic term $5 x^2 y^4$, then m = ...
2. $2x^2$ + ... = zero
3. $6x^2 y$ decreases $-7x^2 y$ by .....

Third: Answer the following:

1. Reduce to the simplest form:

   $2y - 3x - 7y - 5x - y + x$

   .....

   .....

2. What is the expression which should added to $2x - 3x^2 + 5$ to get $6 + x^2 - x$?

   .....

   .....

Model 1

First:

1. zero
2. $8x$
3. $\frac{4}{9}$

Second:

1. $-4a^2b$
2. -3
3. $\frac{6}{5}$

Third:

1. $\frac{5}{17}(10 + 23 + 1) = \frac{5}{17} \times 34 = 10$
2. Distance $= \left|\frac{5}{7} - (\frac{-3}{7})\right|$

$= \left|\frac{5}{7} - \frac{3}{7}\right| = \frac{8}{7}$

The number $= \frac{8}{7} - \frac{1}{4} \times \frac{8}{7} = \frac{6}{7}$

Model 2

First:

1. $\frac{5}{6}$
2. $-x + 5$
3. 5

Second:

1. b
2. zero
3. $\frac{5}{11}$

Third:

1. $-2x^2 + 8x - 13$
2. $\frac{4}{9}(10 + 16 + 1) = \frac{4}{9} \times 27 = 12$

Model 3

First:

1. 0
2. $b \times b \times b$
3. $8a - 4$

Second:

1. 5
2. $\frac{-5}{3}$
3. 12

Third:

1. $-4x^2 + 2x + 4$
2. Distance $= \left|1 - \frac{1}{3}\right| = \frac{2}{3}$

the number $= \frac{1}{3} + \frac{1}{4} \times \frac{2}{3} = \frac{1}{2}$

Model 4

First:

1. $\frac{1}{9}$
2. 1
3. fourth

Second:

1. 1
2. 9
3. $8a^2$

Third:

1. a. $\frac{-1}{3} \times \frac{3}{4} \times -3 = \frac{3}{4}$

b. $(\frac{-1}{3} \times \frac{3}{4}) + (\frac{3}{4} \times -3)$

$= \frac{-1}{4} + \frac{-9}{4} = \frac{-10}{4} = -2\frac{1}{2}$

2. $-2x^2 - 2x + 2$

Model 5

First:

1. $\frac{35}{31}$
2. 70
3. 2

Second:

1. 3
2. $-2x^2$
3. $-13x^2y$

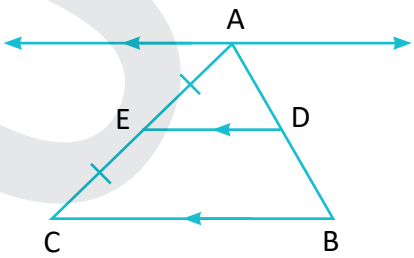
Third:

1. $-6y - 7x$
2. $4x^2 - 3x + 1$

Model 1

First: Choose the correct answer:

1 In the opposite figure:



AD : AB = ...

(a) 1:1 (b) 1:2

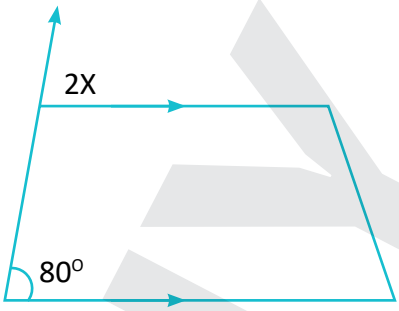
(c) 1:3 (d) 1:4

2 If L_1 and L_2 are to coplanar straight lines where $L_1 \cap L_2 = \emptyset$, then L_1 and L_2 are .....

(a) intersecting (b) perpendicular

(c) parallel (d) coincident

3 In the opposite figure:



What is the value of x?

(a) 40^o (b) 60^o

(c) 80^o (d) 100^o

Second: Complete

1 The two right-angled triangles are congruent if .....

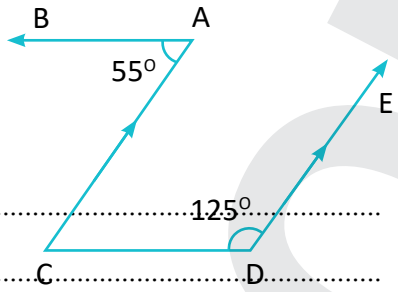
2 If a straight line intersects two parallel straight lines, then ..... are supplementary.

3 ABCD is a parallelogram, $m(\angle A) = 60^o$, then $m(\angle B)$ = ...

Third: Answer the following:

1 If $\overline{DE} \,//\, \overline{CA}$, $m(\angle D) = 125^o$

$m(\angle A) = 55^o$,Find $m(\angle C)$

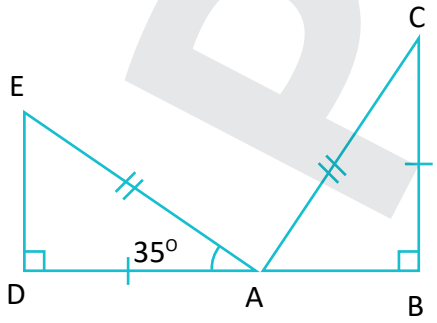


2 In the opposite figure:

$m(\angle DA\boldsymbol{E}) = 35^o$, $m(\angle B) = m(\angle D) = 90^o$

a Prove that $\triangle ABC \equiv \triangle EDA$

b Find with proof: $m(\angle C)$



Model 2

First: Choose the correct answer:

1. If $\triangle ABC \equiv \triangle LMN$, then $m(\angle B) = m(\angle$ .....)

   (a) LMN (b) MNL (c) LNM (d) NLM

2. If L_1 and L_2 are to coplanar straight lines, $L_1 \perp L_3$ and $L_2 \perp L_3$ then .....

   (a) $L_1 // L_2$ (b) $L_1 \perp L_2$

   (c) L_1 is coincides L_2 (d) L_1 intersects L_2

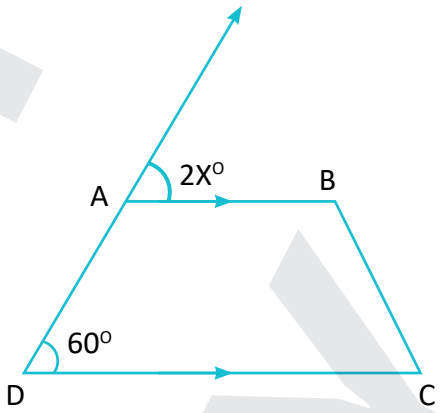
3. In the opposite figure:

   AB // CD, $m(\angle D) = 60^o$

   then x = ...

   (a) 60^o (b) 30^o

   (c) 120^o (d) 80^o



Second: Complete:

1. If a straight line cuts two parallel straight lines, then each two alternate angles are .....

2. The diagonal of the rectangle divides its surface into two ..... triangles.

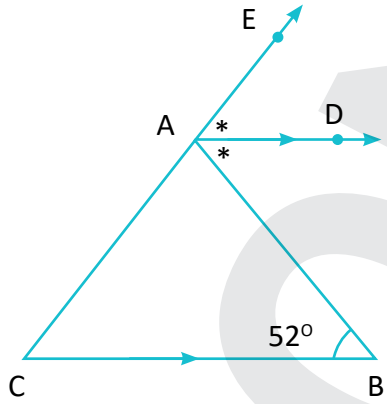
3. If $AB \cap CD = \emptyset$, in the same plane, then .....

Third: Answer the following:

1 In the opposite figure:

$\overrightarrow{AD}$ // $\overline{CB}$, AD bisects ∠ BAE, m(∠B) = 52°

Find: m(∠BAD) , m(∠C)



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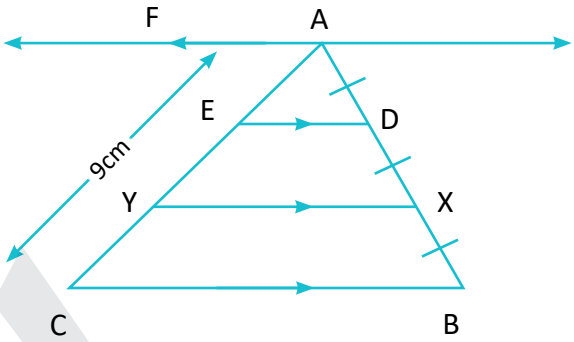
2 In the opposite figure:

$\overleftrightarrow{AF}$ // $\overline{DE}$ // $\overline{XY}$ // $\overline{BC}$,

AD = DX = XB, AC = 9 cm.

Find the length of AY.



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Model 3

First: Choose the correct answer:

1. If L_1 and L_2 are to coplanar straight lines where $L_1 \cap L_2 = \emptyset$, then L_1 and L_2 are .....
   - (a) intersecting
   - (b) perpendicular
   - (c) parallel
   - (d) coincident
2. If $\triangle ABC \equiv \triangle LMN$, $m(\angle A) = 50^\circ$, $m(\angle M) = 60^\circ$, $m(\angle C) =$ .....
   - (a) 60°
   - (b) 50°
   - (c) 70°
   - (d) 10°
3. The two straight lines perpendicular to a third straight line is the same plane are .....
   - (a) perpendicular
   - (b) intersecting
   - (c) parallel
   - (d) coincident

Second: Complete

1. If a straight line cuts two parallel straight lines, then each two corresponding angles are ..... .
2. ABCD is a parallelogram, $m(\angle A) = 85^\circ$, then $m(\angle B) =$ .....
3. The two triangle are congruent if two sides and ..... are congruent with their corresponding parts in the other triangle.

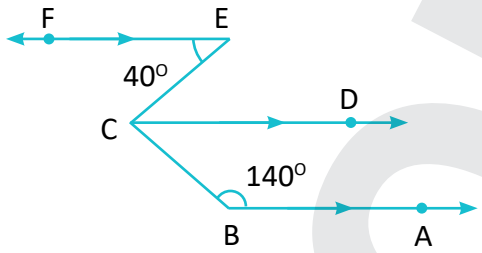
Third: Answer the following:

1 In the opposite figure:

$\overrightarrow{BA}$ // $\overrightarrow{CD}$, $\overrightarrow{CD}$ // $\overrightarrow{EF}$,

$m(\angle E) = 40^o$, $m(\angle B) = 140^o$,

Find: $m(\angle ECB)$



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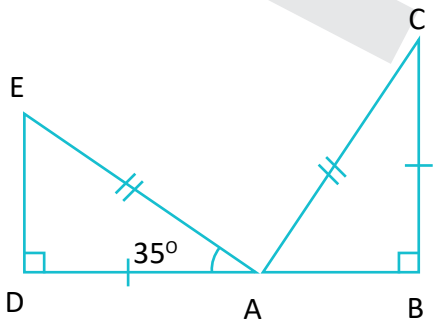
2 In the opposite figure:

$m(\angle DA\boldsymbol{E}) = 35^o$, $m(\angle B) = m(\angle D) = 90^o$

a Prove that $\triangle ABC \equiv \triangle \boldsymbol{E}DA$



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Model 4

First: Choose the correct answer:

1. If $\triangle ABC \equiv \triangle XYZ$, $m(\angle A) + m(\angle B) = 100^\circ$, then $m(\angle Z) =$ .....

   (a) 50° (b) 80° (c) 90° (d) 100°

2. If L_1 and L_2 are to coplanar straight lines, $L_1 // L_2$, $L_2 \perp L_3$, then L_1 ..... L_3

   (a) $\perp$ (b) $//$ (c) $=$ (d) $\equiv$

3. The two straight lines perpendicular to a third straight line in the same plane are .....

   (a) perpendicular (b) intersecting

   (c) parallel (d) coincident

Second: Complete:

1. If $\overleftrightarrow{XY} \cap \overleftrightarrow{ZF} = \emptyset$, in the same plane, then .....

2. If a straight line cuts two parallel straight lines, then each two interior angles are .....

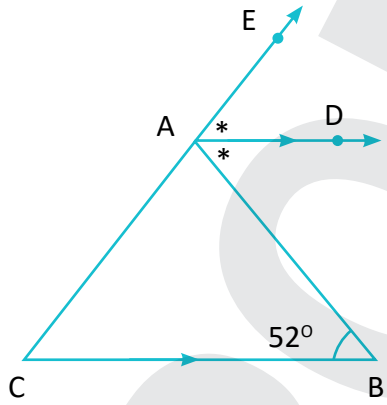
3. If $\triangle ABC \equiv \triangle LMN$, $m(\angle A) = 70^\circ$, $m(\angle M) = 50^\circ$, $m(\angle B) =$ .....

Third: Answer the following:

1 In the opposite figure:

AD // CB, AD bisects ∠ BAE, m(∠B) = 52°

Find: m(∠BAD) , m(∠C)



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2 If AC ∩ BD = {M}, MB = MC, AM = DM, m(∠A) = 30° m(∠DMC) = 85°

Mention the condition of congruency of ΔΔ AMB and DMC, then find m(∠B)

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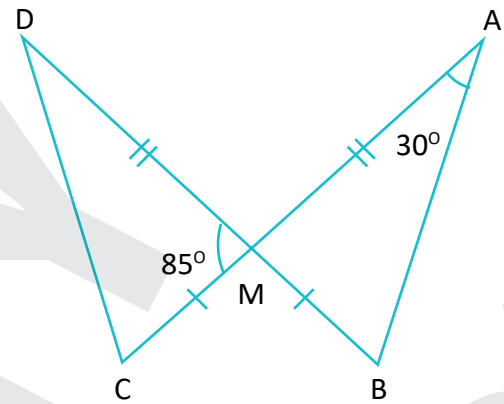

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Model 5

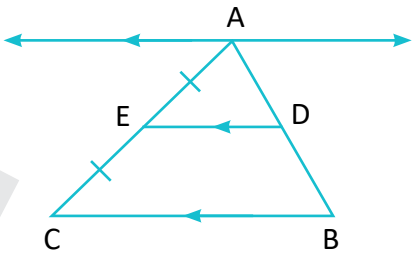
First: Choose the correct answer:

1. If $\triangle ABC \equiv \triangle LMN$, $m(\angle A) = 50^\circ$, $m(\angle M) = 60^\circ$, then $m(\angle B) =$ .....

   (a) 60° (b) 50° (c) 70° (d) 10°

2. In the opposite figure:

   AD : AB = ...



   (a) 1:1 (b) 1:2

   (c) 1:3 (d) 1:4

3. If L_1 and L_2 are to coplanar straight lines, $L_1 \perp L_3$ and $L_2 \perp L_3$ then .....

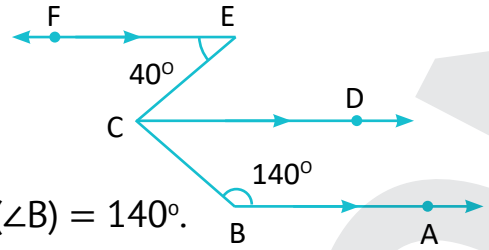
   (a) $L_1 // L_2$ (b) $L_1 \perp L_2$

   (c) L_1 is coincides L_2 (d) L_1 intersects L_2

Second: Complete:

1. ABCD is a rhombus, $m(\angle A) = 65^\circ$, then $m(\angle C) =$ .....
2. The diagonal of the rectangle divides its surface into two ..... triangles.
3. If $\triangle ABC \equiv \triangle XYZ$, $m(\angle A) + m(\angle Y) = 100^\circ$, then $m(\angle C) + m(\angle Z) =$ .....$^\circ$

Third: Answer the following:



1 In the opposite figure:

$\overrightarrow{BA}$ // $\overrightarrow{CD}$, $\overrightarrow{CD}$ // $\overrightarrow{EF}$, $m(\angle E) = 40^\circ$, $m(\angle B) = 140^\circ$.

Find: $m(\angle ECB)$

.....

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2 In the following figure:

$m(\angle A) = m(\angle C) = 90^\circ$, $AB = BC = 5cm$, $AD = 3$ cm.

a Prove that: $\triangle ABD \equiv \triangle CBD$

b Find: the length of CD

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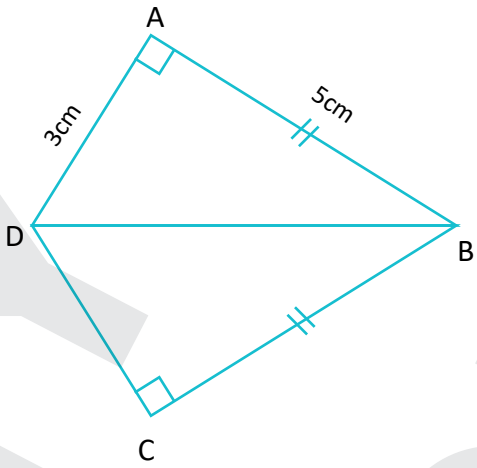

Model 1

First:

1. 1:2 2. parallel 3. 40^o

Second:

1. hypotenuse and side are equal in length
2. interior angles 3. 120^o

Third:

1. since $\overline{DE} \,//\, \overline{CA}$

   then $m(\angle C) = 180 - 125 = 55^o$

   (interior angle)

2. in $\triangle$ $\triangle$ ABC and EDA

$$\begin{cases} m(\angle D) = m(\angle B) & \text{(Right angles)} \\ AC = EA & \text{(Hypotenuse)} \\ BC = DA \end{cases}$$

   then $\triangle ABC \equiv \triangle EDA$

   then $m(\angle C) = (\angle A) = 35^o$

Model 2

First:

1. LMN 2. $L_1 \,//\, L_2$
3. 30^o

Second:

1. equal in measure
2. congruent
3. $\overline{AB} \,//\, \overline{CD}$

Third:

1. since $\overrightarrow{DE} \,//\, \overrightarrow{CA}$

   then $m(\angle BAD) = m(\angle B) = 52^o$

   (alternate angles)

   $m(\angle C) = m(\angle DAE) = 52^o$

   (Corresponding angles)

2. since $\overleftrightarrow{AF} \,//\, \overline{CD} \,//\, \overline{XY} \,//\, \overline{BC}$

   , $\overleftrightarrow{AB}$, $\overleftrightarrow{AC}$ are two transversal to hem

   , $AD = DX = XB$

   then, $AE = EY = YC = \frac{9}{3} = 3cm$

   then, $AY = 6$ cm

Model 3

First:

1. parallel 2. 70^o 3. parallel

Second:

1. equal in measure 2. 95^o
3. included angles

Third:

1. since $\overrightarrow{CD} \,//\, \overrightarrow{EF}$

   then $m(\angle E) = m(\angle ECD) = 40^o$

   (alternate angles)

   since $\overrightarrow{BA} \,//\, \overrightarrow{CD}$

   then $m(\angle DCB) = 180 - 140 = 40^o$

   (interior angles)

   then $m(\angle ECB) = 40 + 40 = 80^o$

2. parallel

Model 4

First:

1. 80^o 2. $\perp$ 3. parallel

Second:

1. $\overleftrightarrow{XY} \;//\; \overleftrightarrow{ZF}$
2. Supplementary
3. 50^o

Third:

1. since $\overrightarrow{DE} \;//\; \overrightarrow{CA}$

   then $m(\angle BAD) = m(\angle B) = 52^o$ (alternate angles)

   $m(\angle C) = m(\angle DAE) = 52^o$ (Corresponding angles)

2. since $\overline{AB} \cap \overline{CD}$ {m}

   then $m(\angle DMC) = m(\angle AMB)$ (V.O.A)

   in $\triangle$ $\triangle$ AMB and DMC

   $$\begin{cases} m(\angle DMC) = m(\angle AMB) \\ \overline{MB} = \overline{MC} \\ \overline{AM} = \overline{DM} \end{cases}$$

   then, $\triangle AMB \equiv \triangle DMC$

   then $m(\angle B) = 180 - (85+30) = 65^o$

Model 5

First:

1. 80^o 2. 1:2 3. $L_1 // L_2$

Second:

1. 65^o
2. congruent
3. 160^o

Third:

1. since $\overrightarrow{DE} \;//\; \overrightarrow{CA}$

   then $m(\angle BAD) = m(\angle B) = 52^o$ (alternate angles)

   $m(\angle C) = m(\angle DAE) = 52^o$ (Corresponding angles)

2. in $\triangle$ $\triangle$ ABD and CBD

   $$\begin{cases} AB = CB \\ m(\angle A) = m(\angle C) \\ BD \text{ is a common side} \end{cases}$$

   then, $\triangle ABD \equiv \triangle CBD$

   then $CD = AD = 3$ cm

Sheet (4)

Multiplying and Dividing Rational Numbers

Properties of the Multiplication operation in Q:

(1) Closure property:

The product of any two rational numbers is a rational number.
i.e.: Q is closed under multiplication operation.

(2) Commutative property:

If a and b are two rational numbers, then
$a \times b = b \times a$

(3) Associative property:

If a, b and c are three rational numbers, then
$(a \times b) \times c = a \times (b \times c)$

(4) Multiplicative identity:

One is the multiplicative identity (multiplicative neutral element).
If a is a rational number, then
$1 \times a = a \times 1 = a$

(5) Multiplicative inverse (reciprocal of the number):

For any rational number $\frac{a}{b}$ except zero there is a multiplicative inverse that is the number $\frac{b}{a}$, where: $\frac{a}{b} \times \frac{b}{a} = 1$

- Zero has no multiplicative inverse because $\frac{1}{zero}$ is undefined.
- Multiplying any rational number by zero equals to zero.

(6) Distribution property:

If a, b and c are three rational numbers, then
$a \times (b + c) = a \times b + a \times c$
$a \times (b - c) = a \times b - a \times c$

Properties of operations:

operation / Property	Addition	Subtraction	Multiplication	Division
Closure	✓	✓	✓	×
Commutative	✓	×	✓	×
Associative	✓	×	✓	×
Identity element	✓ (0)	×	✓ (1)	×
Inverse	✓	×	✓except (0)	×

[1] Complete:

(1) The multiplicative identity element in Q is .....

(2) The multiplicative inverse of $\frac{3}{7}$ is .....

(3) The multiplicative inverse of $\frac{-2}{3}$ is .....

(4) The multiplicative inverse of -6 is .....

(5) The multiplicative inverse of $3\frac{1}{2}$ is .....

(6) The multiplicative inverse of 0.5 is .....

(7) The multiplicative inverse of 1 is .....

(8) The multiplicative inverse of -1 is .....

(9) The multiplicative inverse of $\left(-\frac{3}{5}\right)^{zero}$ is .....

(10) The multiplicative inverse of $\left|-\frac{3}{5}\right|$ is .....

(11) The rational number that has no multiplicative inverse is .....

(12) The rational number $\frac{a-1}{5}$ has a multiplicative inverse if $a \neq$ .....

[2] Put (✓) for the correct statement and (×) for the incorrect one:

(1) Every rational number has a multiplicative inverse. ( )

(2) The multiplicative inverse of a rational number is an integer. ( )

(3) The multiplicative inverse of the number $\frac{0}{7}$ is $\frac{7}{0}$. ( )

(4) The multiplicative inverse of the number $2\frac{1}{5}$ is $5\frac{1}{4}$. ( )

(5) The multiplicative inverse of the number $\left(\frac{2}{7}+\frac{3}{5}\right)$ is $\frac{35}{31}$. ( )

[3] Complete:

The number	The additive inverse	The multiplicative inverse
$\frac{3}{7}$	.....	.....
$\frac{-4}{9}$	.....	.....
-6	.....	.....
0.5	.....	.....
$3\frac{1}{2}$	.....	.....
$\left(\frac{-3}{8}\right)^{zero}$	.....	.....
$\left\|-\frac{3}{7}\right\|$	.....	.....
1	.....	.....
-1	.....	.....
0	.....	.....

[4] Complete:

(1) $\frac{3}{2} \times \left(\frac{-4}{5}\right) = \frac{-4}{5} \times \ldots\ldots$ ..... property

(2) $\frac{2}{3} \times \frac{3}{2} = \ldots\ldots$ ..... property

(3) $7 \times \frac{\ldots\ldots}{7} = 1$ ..... property

(4) $-\frac{4}{5} \times \ldots\ldots = -\frac{4}{5}$ ..... property

(5) $-\frac{4}{11} \times \ldots\ldots = 1$ ..... property

(6) $2\frac{3}{5} \times \ldots\ldots = 1$ ..... property

(7) $0.8 \times \ldots\ldots = 1$ ..... property

(8) $4 \times \ldots\ldots = -5$ ..... property

(9) $\frac{2}{3}\left(2 + \frac{1}{2}\right) = \frac{2}{3} \times 2 + \ldots \times \ldots$ ..... property

(10) $\frac{3}{9} = \frac{2}{3} \times \frac{\ldots}{8}$

(11) If $\frac{x}{y} = \frac{2}{3}$ then, $\frac{3x}{2y} = \ldots\ldots$

(12) If $\frac{a}{b} = 70$ then $\frac{a}{2b} = \ldots\ldots$

[5] Find out the result of each of the following in the simplest form:

(1) $\frac{3}{5} \times \frac{2}{7} = \ldots\ldots$

(2) $\frac{-1}{2} \times \frac{2}{3} = \ldots\ldots$

(3) $-\frac{3}{8} \times \left(-\frac{5}{3}\right) = \ldots\ldots$

(4) $\frac{2}{6} \times \left(-\frac{3}{4}\right) = \ldots\ldots$

(5) $\left(-\frac{2}{3}\right) \times \frac{5}{8} = \ldots\ldots$

(6) $\frac{4}{5} \times \left(-\frac{5}{7}\right) = \ldots\ldots$

(7) $\left|-\frac{3}{7}\right| \times \left(-\frac{4}{3}\right) = \ldots\ldots$

(8) $\frac{1}{2} \times |-12| = \ldots\ldots$

[6] Find out the result of each of the following in the simplest form:

(1) $\frac{4}{5} \div \frac{3}{7} =$ .....

(2) $-\frac{1}{6} \div \frac{5}{2} =$ .....

(3) $\frac{-4}{11} \div \left(\frac{-4}{11}\right) =$ .....

(4) $\frac{5}{27} \div \frac{1}{9} =$ .....

(5) $\frac{5}{6} \div \left(\frac{-15}{2}\right) =$ .....

(6) $\frac{-5}{8} \div \frac{5}{8} =$ .....

(7) *zero* $\div \frac{3}{5} =$ .....

(8) $1 \div \frac{7}{5} =$ .....

[7] Find out the result of each of the following in the simplest form:

(1) $3\frac{1}{2} \times (-4) =$ .....

(2) $1\frac{1}{2} \times \left(\frac{-3}{2}\right) =$ .....

(3) $\left(-4\frac{2}{7}\right) \times \left(-5\frac{1}{6}\right) =$ .....

(4) $3\frac{1}{8} \times \left(-4\frac{1}{5}\right) =$ .....

(5) $\left(-1\frac{1}{2}\right) \times \left|-\frac{5}{3}\right| =$ .....

(6) $0.\dot{6} \times 1\frac{1}{3} =$ .....

[8] Find out the result of each of the following in the simplest form:

(1) $-2\frac{1}{5} \div \frac{11}{5} =$ .....

(2) $-7\frac{5}{6} \div \frac{47}{100} =$ .....

(3) $-4\frac{2}{7} \div 1\frac{1}{14} =$ .....

(4) $-4\frac{1}{3} \div \left(-3\frac{1}{4}\right) =$ .....

(5) $-2\frac{3}{4} \div \left(-3\frac{1}{8}\right) =$ .....

(6) $6\frac{1}{4} \div (-15) =$ .....

[9] Using the distribution property, find out the result of each of the following in the simplest form:

(1) $\frac{5}{12}\times 3+\frac{5}{12}\times 9=$ .....

(2) $\frac{4}{9}\times 11+\frac{4}{9}\times 16=$ .....

(3) $\frac{6}{37}\times 7+\frac{6}{37}\times 5+\frac{6}{37}\times(-11)=$ .....

(4) $\frac{7}{12}\times 5+\frac{7}{12}\times 9-\frac{7}{12}\times 2=$ .....

(5) $\frac{7}{13}\times 6+\frac{7}{13}\times 8-\frac{7}{13}=$ .....

(6) $\left(\frac{-3}{7}\right)\times 8+5\times\left(\frac{-3}{7}\right)+\left(\frac{-3}{7}\right)=$ .....

[10] Find the result in the simplest form:

(1) $\left(\frac{3}{8}+\frac{5}{8}\right)\div\frac{5}{8}=$ .....

(2) $\frac{3}{4}\times\left(\frac{1}{2}-\frac{1}{3}\right)=$ .....

(3) $\left(\frac{-18}{5}\div\frac{9}{35}\right)\times\left(\frac{-3}{7}\right)=$ .....

(4) $-4\frac{1}{3}\div\left(-3\frac{1}{4}\right)=$ .....

(5) $\left[\frac{-12}{25}\times\left(-\frac{5}{7}\right)\right]\div\left(\frac{-9}{14}\right)=$ .....

(6) $\left[\left(-1\frac{2}{3}\right)\times 4\frac{2}{3}\right]\div 6\frac{1}{9}=$ .....

[11] Find the value of (n) in each of the following:

(1) $\frac{-7}{3}\times\frac{-3}{7}=n$ .....

(2) $n\times\frac{17}{3}=1$ .....

(3) $\frac{-7}{3} \times n = 0$ .....

(4) $\frac{5}{7} \times n = \frac{5}{7}$ .....

(5) $n \times \left[\frac{1}{2} + \left(\frac{-3}{5}\right)\right] = n \times \frac{1}{2} + 5 \times \left(\frac{-3}{5}\right)$ .....

[12] If $a = 2$, $b = \frac{1}{2}$ and $c = \frac{3}{2}$, find in the simplest form the value of:

$(a - b) \div c$

.....

[13] If $x = \frac{1}{3}$, $y = \frac{3}{4}$ and $z = -3$, find in the simplest form the numerical value of each of the following:

(1) $x\,y\,z =$ .....

(2) $x\,y + z\,y =$ .....

[14] If $x = \frac{3}{4}$ and $y = \frac{-5}{3}$, find in the simplest form the value of the expression:

$\frac{x - y}{x + y} =$ .....

Sheet (5)
Applications on Rational Numbers

- The distance between two numbers 2 and 5 is:
  $|2-5| = |5-2| = 3$ length units
- The distance between two numbers -2 and 3 is:
  $|-2-3| = |3+2| = 5$ length units
- From the side of the smallest number: $s + f(g - s)$
- From the side of the greatest number: $g - f(g - s)$

Ex (1): Find the rational number lying at the middle of the way between 3 and 7.

The number = $s + f(g - s)$ = ...

Or

The number = $g - f(g - s)$ = ...

Ex (2): Find the rational number lying at the half-way between $\frac{2}{5}$ and $\frac{3}{7}$.

The number = $s + f(g - s)$ = ...

Ex (3): Find the rational number lying at one third of the way between 2 and 8.

From the side of the smaller number = $s + f(g - s)$ = ...

From the side of the greatest number = $g - f(g - s)$ = ...

[1] Find the rational number in the middle of the way (half-way) between:

(1) $\frac{3}{8}$ and $\frac{5}{8}$ .....

(2) $\frac{-3}{4}$ and $\frac{3}{4}$ .....

(3) $\frac{1}{2}$ and $\frac{7}{8}$ .....

(4) $\frac{-11}{4}$ and $\frac{-13}{35}$ .....

[2] Find the rational number lying at:

(1) One fourth of the way between $\frac{5}{7}$ and $\frac{-3}{7}$ from the side of the smaller number.

.....

(2) One third of the way between $\frac{-3}{5}$ and $\frac{-4}{5}$ from the side of the greater number.

.....

(3) One third of the way between $\frac{4}{7}$ and $1\frac{3}{4}$ from the side of the smaller number.

.....

(4) One fifth of the way between $\frac{-2}{3}$ and $\frac{-3}{5}$ from the side of the smaller number.

.....

[3] Choose the correct answer:

(1) If $a \times \frac{b}{2} = \frac{a}{2}$, $a \neq 0$, then b = ...

(a) $\frac{a}{2}$ (b) 0 (c) a (d) 1 (e) -a

(2) If $\frac{x}{3} - 4 = 6$, then $\frac{x}{3} + \frac{2}{3}$ = ...

(a) 1 (b) x (c) $\frac{32}{3}$ (d) 10 (e) $\frac{2x}{9}$

(3) If $\frac{x}{y} = 1$, then $2x - 2y$ = ...

(a) 4 (b) 2 (c) 1 (d) 0 (e) $\frac{1}{2}$

(4) If $x + \frac{2}{x} = 5 + \frac{2}{5}$, then x = ...

(a) $\frac{1}{5}$ (b) $\frac{4}{5}$ (c) 1 (d) $\frac{5}{2}$ (e) 5

(5) If $5a = 45$ and $ba = 1$, then b = ...

(a) $\frac{1}{45}$ (b) $\frac{1}{9}$ (c) $\frac{1}{5}$ (d) 5 (e) 9

(6) The number $\frac{x-3}{x-5} \in Q$ *if* $x \neq$ .....

(a) 3 (b) -3 (c) 5 (d) -5 (e) 15

[4] Find three rational numbers lying between $\frac{3}{2}$ and $\frac{3}{4}$, such that one of them is an integer.

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Sheet (6)

Algebraic Terms & Algebraic Expressions

The perimeter and the area of some shapes

[1] The square:

- $P = S \times 4 = 4\,S$ (coeff. = 4 and degree = 1st)
- $A = S \times S = S^2$ (coeff. = 1 and degree = 2nd)

[2] Rectangle:

- $P = (\ell + w) \times 2 = 2(\ell + w)$
- $A = \ell \times w = \ell\, w$ (coeff. = 1 and degree = 2nd)

[3] Parallelogram:

- $P = (x + y) \times 2 = 2(x + y)$
- $A = b \times h = b\,h$

[4] Rhombus:

- $P = S \times 4 = 4\,S$
- $A = S \times h = S\,h$ or $A = \frac{1}{2} \times d_1 \times d_2$

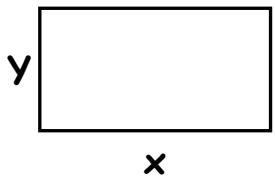
[5] Triangle:

- P = the sum of all side lengths
- Perimeter of equilateral triangle = 3 S
- $A = \frac{1}{2} b\,h$

- If we denote one pound by x, if we have 3 pounds
  $x + x + x = 3x$ (coeff. = 3 and degree = 1st)

- The algebraic term is formed from the product of two or more factors.
- The degree of the algebraic term is the sum of the indices of the algebraic factors in this term.
- Any number is an algebraic term of zero degree.
- The algebraic term has no algebraic factors is called the absolute term.
- The algebraic expression consists of an algebraic term (monomial) or more.
- The degree of the algebraic expression is the highest degree of its terms.

[1] Write the algebraic term that represent the area of each shape:



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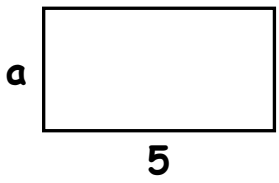

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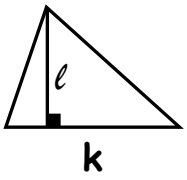

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[2] Complete the table:

Algebraic term	$2\,a\,b^2$	$7\,a\,b^3\,c$	$-8\,x^2\,b$	3	$(-2)^3$	$\frac{1}{2}x^3y\,z^2$
Coefficient						
Degree						

[3] Complete the table:

The Algebraic expression	No. of terms	Name	Degree
$-3\ a^5\ b$		MONOMIAL	
$3x^2 + y$		BINOMIAL	
$5x^3 - 7x + 4$		TRINOMIAL	
$2a^2\ b + 3a\ b^2 - a^2\ b^2$		TRINOMIAL	
$x^2\ y^2 - 3x\ y^4$		BINOMIAL	
$a^2\ b - 3a\ b^3 + 2a^3\ b^2 + b^4$		QUADRILATERAL	

[4] Complete:

(1) The coefficient of algebraic term $3\ x^2\ y$ is ..... and its degree is .....

(2) The coefficient of algebraic term $\frac{1}{2} x^3\ y\ z^2$ is ..... and its degree is .....

(3) The degree of the absolute term in an algebraic expression is .....

(4) The algebraic expression $5x^2 + 3$ is of the ..... degree.

[5] Choose the correct answer:

(1) The degree of the algebraic term $2x^3y^2$ is .....

(a) second (b) third (c) fourth (d) fifth

(2) The coefficient of the algebraic term $3xy^3z^4$ is .....

(a) 2 (b) 3 (c) 6 (d) 7

(3) The degree of the algebraic expression $3x^2 + 3x^4$ equals to the degree of the algebraic expression .....

(a) $5xy+3y^2z$ (b) $2x^2y^2 + 3x^2y$ (c) $2xy + 3x^4z$ (d) $5a^2b + 4ab^2$

(4) The number of terms of the algebraic expression $3x^2+5xy+6$ is .....

(a) 1 (b) 2 (c) 3 (d) 4

(5) The ..... operation is unclosed in the set of rational numbers.

(a) addition (b) subtraction (c) division (d) multiplication

(6) If the degree of the algebraic term $2a^3b^n$ is ninth, then n = ...

(a) 8 (b) 6 (c) 2 (d) 9

(7) The algebraic term b^3 = ...

(a) $3\ b \times b$ (b) $b + b + b$ (c) $b \times b \times b$ (d) $3 \times b$

[6] Arrange the terms of the following algebraic expressions according to the descending order of the indices of a:

(1) $5a + a^2 - 7 + a^3$ = ...

(2) $2\ a^2\ b^2 + 5\ b\ a^3 - 3\ b^3\ a$ = ...

[7] Arrange the terms of the following algebraic expressions according to the ascending order of the indices of x:

(1) $5x + x^2 - 7 + x^3$ = ...

(2) $2\ x^2\ y^2 + 5\ y\ x^3 - 3\ y^3\ x$ = ...

Sheet (7)
Like Algebraic Terms

☞ The algebraic terms are said to be like if they having the same symbols and the same degree. Such as:

Like terms	Unlike terms
☞ $2a$, a and $-5a$. ☞ $2x^2y$, $4yx^2$ and $-\frac{1}{2}x^2y$	☞ $2x$, $-3x^2$ and $7x^3$ ☞ $4x^2$, $5xy$ and y^2

[1] Put (✓) for the correct statement and (×) for the incorrect one:

(1) The two algebraic terms x^2 and $2x$ are like terms. ( )

(2) The two algebraic terms $3\,a\,b^2$ and $-\,a\,b^2$ are like terms. ( )

(3) The two algebraic terms $7x^2$ and $2x^7$ are like terms. ( )

(4) The two algebraic terms $3\,a^2\,b^3$ and $-2\,b^3\,a^2$ are like terms. ( )

(5) $2\,a + 3\,a = 5\,a^2$ ( )

(6) $7\,x^2 - 2\,x^2 = 5\,x^2$ ( )

(7) $8\,y^2 - 5\,y = 3\,y$ ( )

(8) $3\,a\,b - 3\,b\,a =$ zero ( )

[2] Find the result of each of the following:

(1) $3\,x + x =$ ..... (2) $7\,y - y =$ .....

(3) $3\,x + 2\,x =$ ..... (4) $5\,y - 3\,y =$ .....

(5) $4\,z - 11\,z =$ ..... (6) $-\,7\,x - 2\,x =$ .....

(7) $2\,a + 3\,a - 4\,a =$ ..... (8) $-\,3\,a^2 + 5\,a^2 =$ .....

(9) $\frac{5x}{4} + \frac{3x}{4} =$ ..... (10) $\frac{3x}{5} - \frac{x}{5} =$ .....

[3] Answer each of the following:

(1) Subtract y^2 from $-3y^2$ .....

(2) Subtract $-6x^2y$ from $9x^2y$ .....

(3) What is the increase $-2x$ of $-5x$? .....

(4) What is the increase $3a^2b$ of a^2b? .....

(5) What is the decrease $-3ab$ of $2ab$? .....

(6) What is the decrease $6x^2y$ of $-7x^2y$? .....

[4] Complete:

(1) The result of subtracting 3a from 7a is .....

(2) The result of subtracting $3x^2$ from $-5x^2$ is .....

(3) The result of subtracting $7y^3$ from zero is .....

(4) The result of subtracting -3a from 2a is .....

(5) 5a increases 3a by .....

(6) 7x increases -3x by .....

(7) 4x decreases 7x by .....

(8) 5x decreases 3x by .....

(9) 2x decreases 4x by ..... while 2x increases 4x by .....

(10) ..... + $2a^2 = 7a^2$

(11) $3x^2$ - ..... = x^2

(12) $2m^2$ + ... = zero

(13) $5\,a^2\,b$ - ..... = $7\,a^2\,b$

(14) If $4x - y = 11$ and $y = 3x$, then x = ...

[5] If the sum of two terms is 12 x2 y one of them is 4 x2 y. Find the other term.

.....

[6] Reduce to the simplest form:

(1) 3a + 2b + 5a + 4b = ...

(2) 2x – 4y – 9x – 3y = ...

(3) 3x – 5y – x + 2y = ...

(4) 19 m – 4 n + 11 m – 17 n + 9 n = ...

(5) 4 a + a b + 5 a – 2 b + 6 b – 3 a = ...

[7] Reduce each of the following algebraic expressions:

(1) $5x + 4 - 3x^2 - 6x - 7x^2 - 1$ = ...

.....

.....

(2) $6x^2y - 3xy^2 + 2xy^2 - 5x^2y + 2x^2y^2$ = ...

.....

.....

(3) $a^2 + 4a - 5 + 3a^2 - 6a + 1$ = ...

.....

.....

(4) $5x^2 - 2x + 8 - 7x - 3 + x^2$ = ...

.....

.....

Sheet (8)
Adding and Subtracting Expressions

[1] Find the sum of each of the following:

(1) $3x - 2y + 5$ and $x + 2y - 2$

(2) $3n^2 + 5n - 6$ and $-n^2 - 3n + 3$

(3) $3\ell - 4m + 5n$ and $4m - 5n - \ell$

(4) $3a^3 - 2a^2b + b^3$ and $a^3 + 4a^2b - b^3$

[2] Find the sum:

(1) $3a + 2b - 5$, $2a - 7b + 4$, $5b - 4a + 3$

(2) $3x + 3y - z$, $3x + 3z - 2y$, $x + 2y + z$

(3) $5x^2 - 3x + 9$, $x^2 + 2x - 5$, $x^2 - 3 - 6x$

(4) $3x - 4x^2 + 2$, $x^2 + x - 5$, $3 + 3x^2 - 4x$

[3] Subtract:

(1) x - 2 from 2x - 5

.....

.....

.....

.....

(2) 2x + 6y - 7 from 2x - 5y +2

.....

.....

.....

.....

[4] What is the increase of:

(1) 5a + 7b than 3a - 2b

.....

.....

.....

.....

(2) x^2 - 5x -1 than $3x^2$ + 2x - 3

.....

.....

.....

.....

[5] What is the decrease of:

(1) 2a + 3b than 5b - 3a

.....

.....

.....

.....

(2) $3y^2-2xy+x^2$ than $3x^2-5xy+y^2$

.....

.....

.....

.....

[6] Subtract x + x2 – 5 from 2x2 + x – 3, then find the numerical value of the result when x = 6

.....

.....

.....

.....

.....

Sheet (9)
Multiplying and Dividing Algebraic Terms

[1] Multiply:

(1) $5x \times 3y$ = ...

(2) $(-3a) \times 7c$ = ...

(3) $2x \times (-3x)$ = ...

(4) $(-8y^5) \times (-7y^4)$ = ...

(5) $2xy \times (-3x^2)$ = ...

(6) $5x^3y^4 \times 2xy^2$ = ...

(7) $5ab^2 \times (-2a^2b)$ = ...

(8) $ab \times (-3a) \times (-2b)$ = ...

(9) $2x^3 \times (-3x^2) \times (-5x^4)$ = ...

(10) $(-2x) \times 4x$ = ...

[2] If the symbols represent non-zero integers, find the quotient of each of the following:

(1) $6a \div 2$ = ...

(2) $10c \div 2c$ = ...

(3) $12x \div (-x)$ = ...

(4) $(-14x^2) \div 7x$ = ...

(5) $(-25a^6) \div (-5a^2)$ = ...

(6) $24c^5 \div (-24c^5)$ = ...

(7) $9x^5y^4 \div 6x^3y$ = ...

(8) $(-32a^3b^6) \div (-4a^3b^2)$ = ...

(9) $8m^4n^3 \div (-4m\ n^2)$ = ...

[3] Simplify:

(1) $\frac{2}{3}t^4 \times \frac{3}{2}t^4$ = ...

(2) $\frac{2}{7}a^2 \times 21a^5$ = ...

(3) $\frac{6x^4y^2}{7} \times \frac{28x\ y^3}{3}$ = ...

(4) $3x^3 \times \frac{1}{6}x^2$ = ...

[4] Choose the correct answer:

(1) $3a^4b \times 5a^2b^2 \times 2a^3$ = ...

(a) $60a^{11}b^3$ (b) $30a^{10}b^2$ (c) $150a^{10}b^3$ (d) $30a^9b^3$

(2) $(-3x^2y)^2 \times 2xy$ = ...

(a) $-18x^5y^3$ (b) $18x^5y^3$ (c) $6x^3y^2$ (d) $9x^2y^2$

(3) $(-6x^3y^2) \div 3x^2y$ = ...

(a) $-2x^2y$ (b) $2xy$ (c) $-2xy$ (d) $-2x^2y^2$

(4) If $2b$ cm is the edge length of a cube, then its volume = ... cm^3

(a) $4b^2$ (b) $2b^3$ (c) $4b^3$ (d) $8b^3$

(5) If the area of a rectangle is $24x^3$ cm^2 and its length is $8x^2$ cm, then its width is .....

(a) $3x$ (b) $3x^2$ (c) $4x$ (d) $4x^5$

[5] Complete:

(1) $9a^5 = 3a \times .....$

(2) $36a^5b^8 = 12a^3b^2 \times .....$

(3) $-4c^3d^3 = 2c\,d^2 \times .....$

(4) $81l^4 \div ..... = 27l^3$

(5) $..... \div 6a^2 = -4a^4$

(6) $36a^7b^4 = ... \times 9a^7b$

Sheet (10)
Multiplying a monomial by an algebraic expression

[1] Find the following products:

(1) $a(a+1)$ = ...

(2) $a(a-2)$ = ...

(3) $3x(7y-4z)$ = ...

(4) $-3(y+3)$ = ...

(5) $-2c(7-3c)$ = ...

(6) $2x(3x^2+4y^2)$ = ...

(7) $-5x(2x+y-3z)$ = ...

(8) $3xy(2x^2-5x^2y-4y^2)$ = ...

(9) $l\,m^2(l^2-3m\,l-4m^2)$ = ...

(10) $\frac{1}{3}x^2(6x^2-9x\,y-3y^2)$ = ...

[2] Put in the simplest form:

(1) $3a(a-b)+4a(2a+b)$

= .....

= .....

(2) $3a(4a - 2) - 4a(3a - 2)$

= .....

= .....

[3] Simplify $2a(3a - 1) + 3a(a + 2)$, then find the numerical value of the result when a = 1:

$2a(3a - 1) + 3a(a + 2)$

= .....

= .....

= .....

= .....

Sheet (11)

Multiplying a binomial by an algebraic expression

We have 3 ideas of the examples on this lesson

1st idea this is the general idea

[1] Find by direct products:

(1) $(x+3)(x+2)$ = ...

(2) $(x-3)(x-2)$ = ...

(3) $(x+2)(x-5)$ = ...

(4) $(y-4)(y+5)$ = ...

(5) $(x+2)(x+4)$ = ...

(6) $(y-5)(y+2)$ = ...

(7) $(5m-2)(6m+1)$ = ...

(8) $(4x+1)(2x+3)$ = ...

(9) $(3a+2b)(2a-5b)$ = ...

(10) $(b^2-4)(b^2+2)$ = ...

(11) $(x-y)(7y-x)$ = ...

2nd idea (special case of 1st idea)

[2] Find by inspection the expansion of each of the following:

(1) $(x+2)^2$ = ...

(2) $(x+3)^2$ = ...

(3) $(x+1)^2$ = ...

(4) $(x-1)^2$ = ...

(5) $(2y+3)^2$ = ...

(6) $(4m-7)^2$ = ...

(7) $(3x+y)^2$ = ...

(8) $(x-3y)^2$ = ...

(9) $(2x+3y)^2$ = ...

(10) $(-l-m)^2$ = ...

(11) $(-4x-7)^2$ = ...

3rd idea special case of 1st idea

[3] Find by inspection the expansion of each of the following:

(1) $(x+3)(x-3)$ = ...

(2) $(x-4)(x+4)$ = ...

(3) $(x-2)(x+2)$ = ...

(4) $(4m-7)(4m+7)$ = ...

(5) $(6x+2y)(6x-2y)$ = ...

(6) $(a^2+a)(a^2-a)$ = ...

(7) $(3x^2+5y^2)(3x^2-5y^2)$ = ...

(8) $\left(\frac{1}{2}x+\frac{1}{3}y\right)\left(\frac{1}{2}x-\frac{1}{3}y\right)$ = ...

[4] Choose the correct answer:

(1) The middle term in the expansion of $(3x-1)^2$ is .....

(a) $3x$ (b) $-6x$ (c) $6x$ (d) $6x^2$

(2) The middle term in the expansion of $(2a+3b)^2$ is .....

(a) $12ab$ (b) $-12ab$ (c) $6ab$ (d) $-6ab$

(3) If $(2x+y)^2 = 4x^2 + k\,x\,y + y^2$, then k = ...

(a) 2 (b) 4 (c) 8 (d) 6

(4) If $x = -1$, then the numerical value of $(x+1)^2$ is .....

(a) zero (b) 1 (c) 2 (d) 3

(5) If $x^2 = 16$, $y^2 = 9$ and $x\,y = 12$, then $(x-y)^2$ = ...

(a) 49 (b) 165 (c) -1 (d) 1

(6) If $(x+y)^2 = 26$ and $x^2 + y^2 = 20$, then $x\,y$ = ...

(a) 3 (b) 6 (c) 9 (d) 12

(7) If $x + y = 7$, then the numerical value of $x^2 + 2xy + y^2 = \ldots$

(a) 7 (b) 14 (c) 49 (d) 28

(8) If $x - y = 3$ and $x + y = 5$, then $x^2 - y^2 = \ldots\ldots$

(a) 2 (b) -2 (c) 8 (d) 15

(9) If $x = \frac{4}{3}$, then $(x - 2)(x + 2) = \ldots\ldots$

(a) $\frac{4}{3} - 2$ (b) $\left(\frac{4}{3}\right)^2 - 2$ (c) $\left(\frac{4}{3}\right)^2 - 4$ (d) $\left(\frac{4}{3}\right)^2 + 4$

(10) If $(x - 3)(x + 3) = x^2 + k$, then $k = \ldots\ldots$

(a) 9 (b) 6 (c) -9 (d) -6

(11) If $(x - y)(2x + y) = 2x^2 + k\,x\,y - y^2$, then $|k| = \ldots\ldots$

(a) -1 (b) 1 (c) 3 (d) 4

[5] Multiply, then find the numerical value of the expression when $x = 1$ and $y = -2$:

(1) $(x - 5y)(x + 5y)$ = ...

= .....

(2) $(3x + y)(x + 3y)$ = ...

= .....

(3) $(x + 4)(3x + 2)$ = ...

= .....

[6] Reduce $(x-y)^2+2xy$, then find the numerical value of the result when $x=-1$ and $y=-2$:

= .....

= .....

= .....

= .....

[7] Reduce = $(2x-2)^2+(x-2)(x+2)$, then find the numerical value of the result when $x=-1$:

= .....

= .....

= .....

= .....

[8] Simplify to the simplest form $(2a-3)(2a+3)+7$, then find the numerical value of the result when $a=-1$:

= .....

= .....

= .....

= .....

Sheet (12)

Dividing an algebraic expression by a monomial

[1] If the symbols in the following expressions are non-zero numbers, find the quotient in each case:

(1) $5a - 10$ by 5 = ...

(2) $4a^2 + 6a$ by $2a$ = ...

(3) $12a^2b + 20a\,b^2$ by $4a\,b$ = ...

(4) $16a^3b^2 - 24a^2b^2$ by $4a^2b$ = ...

(5) $12x + 15y$ by -3 = ...

(6) $24x^3 - 18x^2$ by $-6x^2$ = ...

(7) $60x^6 - 48x^{10} - 12x^3$ by $-12x^3$ = ...

= .....

(8) $32x^5 - 48x^3 + 72x^7$ by $-8x^3$ = ...

= .....

[2] Find the quotient of each of the following:

(1) $\dfrac{26x^2 + 14x^4}{2x}$ = ... = ...

(2) $\dfrac{18m^4 + 32m^2}{-2m^2}$ = ... = ...

(3) $\dfrac{48x^3 - 80x^2}{8x^2}$ = ... = ...

(4) $\dfrac{9l^3m^4 - 18l\ m^2}{3l\ m^2}$ = ... = ...

[3] Choose the correct answer:

(1) $(x^2 + x) \div x = \ldots\ldots,\ x \neq 0$

(a) zero (b) x (c) $2x + 1$ (d) $x + 1$

(2) $(15a + 5) \div 5 = \ldots\ldots$

(a) $3a$ (b) $10a$ (c) $3a + 1$ (d) $4a$

(3) $(4a^3 - 2a) \div (-2a) = \ldots\ldots,\ a \neq 0$

(a) $-2a^2$ (b) $-2a^2 + 1$ (c) $2a^2 + 1$ (d) -1

(4) $(15x^4 + 5x^3) \div 5x^3 = \ldots\ldots$

(a) $3x^2 + x$ (b) $5x^2 + 1$ (c) $3x + 1$ (d) $4x^4$

(5) $(3x^2y - \ldots\ldots) \div 3x\ y = x - 2y$

(a) $6x$ (b) $6x\ y^2$ (c) $6y^2$ (d) $-6x\ y^2$

(6) If $(6x^2y^3 + k\ x\ y) \div 6x = x\ y^3 - 12y,\ x \neq 0$, then $|k| = \ldots\ldots$

(a) -72 (b) -2 (c) 2 (d) 72

Sheet (13)

Dividing an algebraic expression by another one

[1] Find the quotient of each of the following:

(1) $x^2 + 5x + 6$ by $x + 2$

(2) $y^2 - 9y + 20$ by $y - 4$

(3) $x^2 - 5x - 14$ by $x - 7$

(4) $2x^2 + 13x + 15$ by $x + 5$

(5) $3x^2 + 2x - 8$ by $3x - 4$

(6) $x^2 - 6 - x$ by $x + 2$

[2] If the area of a rectangle is $(15x^2 + 11x - 14)$ cm2 and its width is $(3x - 2)$ cm. Calculate its length.

[3] If the area of a rectangle is $(2x^2 + 7x - 15)$ cm2 and its length is $(x + 5)$ cm. Find its width and calculate its perimeter when $x = 3$.

a If $x = -\frac{1}{3}$, $y = \frac{3}{4}$ and $z = -3$, **find the numerical value of :** $4xy + z$

Solution $= 4 \times \frac{-1}{3} \times \frac{3}{4} + (-3) = -1 - 3 = -4$

b If $x = \frac{3}{4}$, $y = -\frac{5}{2}$, **find in simplest form the value of :**

$(x - y) \div (x + y)$ Solution $= \left(\frac{3}{4} - \left(\frac{-5}{2}\right)\right) \div \left(\frac{3}{4} + \left(\frac{-5}{2}\right)\right)$

$= \left(\frac{3}{4} + \frac{10}{4}\right) \div \left(\frac{3}{4} - \frac{10}{4}\right)$

$= \frac{13}{4} \div \frac{-7}{4} = \frac{13}{4} \times \frac{-4}{7} = \frac{-13}{7}$

c If $x = \frac{1}{2}$, $y = \frac{-2}{3}$, $z = 2$, **find the value of :** $\frac{y - z}{x}$

Solution $y - z = \frac{-2}{3} - 2 = \frac{-2}{3} - \frac{6}{3} = \frac{-8}{3} \div \frac{1}{2} = \frac{-8}{3} \times 2 = \frac{-16}{3}$

d If $x = \frac{2}{3}$, $y = \frac{-3}{4}$, $z = -3$, **find the value of :** $xy - z$

Solution $\frac{\cancel{2}^{1}}{\cancel{3}} \times \frac{\cancel{-3}}{\cancel{4}_{2}} - (-3) = \frac{-1}{2} + 3 = 2\frac{1}{2}$

E If $a = \frac{1}{2}$, $b = -\frac{2}{3}$ and $c = 3$ **Find the value of :** $a^2 - 2bc$

Solution $= \left(\frac{1}{2}\right)^2 - 2 \times \left(\frac{-2}{3}\right) \times 3 = \frac{1}{4} + 4 = 4\frac{1}{4}$

F If $a = \frac{7}{4}$, $b = \frac{-1}{2}$, **find the value of :** $(a - b) \div (a + b)$

Solution $= \left(\frac{7}{4} - \left(\frac{-1}{2}\right)\right) \div \left(\frac{7}{4} + \left(\frac{-1}{2}\right)\right) = \left(\frac{7}{4} + \frac{2}{4}\right) \div \left(\frac{7}{4} - \frac{2}{4}\right)$

$= \frac{9}{4} \div \frac{5}{4} = \frac{9}{4} \times \frac{4}{5} = \frac{9}{5}$

A

If $x = \frac{3}{2}$, $y = -\frac{1}{4}$ and $z = -2$,

find in the simplest form the numerical value of the following : $x - (z \div y)$

Solution $= \frac{3}{2} - [-2 \div (-\frac{1}{4})]$

$= \frac{3}{2} - [-2 \times (-4)]$ $= \frac{3}{2} - 8 = -\frac{13}{2}$

B

If the two rational numbers $\frac{3x}{4}$ and $\frac{2}{3}$ are equal , **find the value of** x

Solution $\frac{3x}{4} = \frac{2}{3}$ $x = \frac{4 \times 2}{3 \times 3} = \frac{8}{9}$

C

If $a = \frac{3}{4}$, $b = -\frac{5}{2}$, without using calculator find the value of : $4a - 6b$

Solution The numerical value $= 4 \times \frac{3}{4} - 6 \times \frac{-5}{2} = 3 + 15 = 18$

D

Find in the simplest form the value of each of the following :

① $-15\frac{1}{4} + 12\frac{1}{2}$

Solution $-15\frac{1}{4} = -\frac{61}{4}$, $12\frac{1}{2} = \frac{25}{2}$

$-15\frac{1}{4} + 12\frac{1}{2} = \frac{-61}{4} + \frac{50}{4} = -\frac{11}{4} = -2\frac{3}{4}$

② $0.\dot{1}\dot{8} - 25\,\%$

Solution

$0.\dot{1}\dot{8} = \frac{2}{11}$, $25\,\% = \frac{1}{4}$

$\frac{2}{11} - \frac{1}{4} = \frac{8}{44} - \frac{11}{44} = -\frac{3}{44}$

F

If $a = \frac{7}{4}$, $b = \frac{1}{2}$, find the numerical value of the expression : $\frac{a-b}{a+b}$

$a - b = \frac{7}{4} - \frac{1}{2} = \frac{7}{4} - \frac{2}{4} = \frac{5}{4}$

$a + b = \frac{7}{4} + \frac{1}{2} = \frac{7}{4} + \frac{2}{4}$

$\frac{a-b}{a+b} = \frac{5}{4} \times \frac{4}{9} = \frac{5}{9}$

A **Find the rational number that lies halfway between :** $\frac{1}{2}$ and $\frac{4}{5}$

Solution

The number $= \left(\frac{1}{2} + \frac{4}{5}\right) \div 2 = \frac{13}{20}$

B **Find a rational number lying at :**

(1) One fourth of the way between $\frac{5}{7}$, $-\frac{3}{7}$ *from the side of the smaller number.*

Solution

The distance between the two numbers

$= |\frac{5}{7} - (-\frac{3}{7})| = |\frac{5}{7} + \frac{3}{7}| = \frac{8}{7}$

Then the number $= -\frac{3}{7} + \frac{1}{4} \times \frac{8}{7} = -\frac{3}{7} + \frac{2}{7} = -\frac{1}{7}$

C One fifth of the way between $-\frac{1}{2}$, $-\frac{2}{5}$ *from the side of the greater number.*

Solution

The distance between the two numbers

$= |-\frac{1}{2} - (-\frac{2}{5})| = |-\frac{1}{2} + \frac{2}{5}| = |-\frac{5}{10} + \frac{4}{10}| = \frac{1}{10}$

Then the number

$= -\frac{4}{10} - \frac{1}{5} \times \frac{1}{10} = -\frac{4}{10} - \frac{1}{50} = \frac{-20-1}{50} = -\frac{21}{50}$

D One tenth of the way between $\frac{5}{6}$, $\frac{2}{3}$ *from the side of the smaller number.*

Solution

The distance between the two numbers

$= |\frac{5}{6} - \frac{2}{3}| = |\frac{5}{6} - \frac{4}{6}| = \frac{1}{6}$

Then the number $= \frac{4}{6} + \frac{1}{10} \times \frac{1}{6} = \frac{4}{6} + \frac{1}{60}$

$= \frac{40+1}{60} = \frac{41}{60}$

E Find the number one fourth of the way between $-\frac{1}{4}$ and $-\frac{7}{8}$ from the side of the smaller number.

F Find the number that lies one third of the way between $\frac{1}{4}$ and $\frac{7}{8}$ from the side of the smaller one.

G **Find the rational number that lies half way between :** $\frac{1}{2}$, $\frac{1}{5}$

H **Find the rational number that lies halfway between :** $\frac{1}{2}$ and $\frac{4}{5}$

Find three rational numbers lying between

A $\frac{1}{4}$ and $\frac{1}{5}$

First $\frac{1 \times 5}{4 \times 5} = \frac{5 \times 10}{20 \times 10} = \frac{50}{100}$

Second $\frac{1 \times 4}{1 \times 5} = \frac{4 \times 10}{20 \times 10} = \frac{40}{100}$

three rational numbers $= \frac{41}{100} / \frac{42}{100} / \frac{43}{100}$

B Find three rational numbers between : $\frac{1}{2}$ and $\frac{1}{3}$

First $\frac{1 \times 3}{2 \times 3} = \frac{3 \times 10}{6 \times 10} = \frac{30}{60}$

Second $\frac{1 \times 2}{3 \times 2} = \frac{2 \times 10}{6 \times 10} = \frac{20}{60}$

three rational numbers $= \frac{21}{60} / \frac{22}{60} / \frac{23}{60}$

C Write three rational numbers between : $\frac{4}{9}$ and $\frac{5}{6}$

First $\frac{4 \times 6}{9 \times 6} = \frac{24}{54}$

Second $\frac{5 \times 9}{6 \times 9} = \frac{45}{54}$

three rational numbers $\frac{24}{54} / \frac{25}{54} / \frac{26}{54}$

A

What is the increase of :

$3x^2-5x+2$ than $7x^2-x-3$?

Solution

Increase في حاله

يبقي كما هو و نغير

than ال بعد

$$\begin{array}{r} 3x^2-5x+2 \\ \ominus \quad \oplus \quad \oplus \\ 7x^2-x-3 \\ \hline -4x^2-4x+5 \end{array}$$

What is the increase of :

$4x^2-6x+5$ **than** $7x^2-x-9$

Solution

B

Add the two expressions

$7x-3y-1$ **and** $2x+5y+3$

في حاله الجمع والطرح

متجيش جمب الاسس و الرموز ي حمار تنزل

ذي ما هي ما عدا الصفر

Solution

$$\begin{array}{r} 7x-3y-1 \\ 2x+5y+3 \\ \hline 9x+2y+2 \end{array}$$

C

Add : $2x-6z+y$, $3y+2z-5x$

Add : $3x^2-5x+1$ **and** x^2+x+3

Add : $5x^2+y^2-3xy$ **and** $x^2-2xy+3y^2$

Example 2 **Add the following expressions :**

$3x^3-4x^2+2x-1$, $5x^2-2x^3+3$ **and** $2-3x+x^2$

The first expression	:	$3x^3-4x^2+2x-1$
The second expression	:	$-2x^3+5x^2+3$
The third expression	:	$+x^2-3x+2$
The sum	=	x^3+2x^2-x+4

A

Example 4 **Subtract :** $5x - 3y + 2z$ **from** $2y - z + 7x$

Solution

$: 2y \quad -z \quad +7x$

$\oplus \quad \ominus \quad \ominus$

$: -3y + 2z + 5x$

$= 5y - 3z + 2x$

في حالة subtract from
ال بعد from
يكتب في السطر الاول
واغير اشاره الاول

B

Subtract : $y^3 + 5y^2 - 5y$ **from** $2y - y^3 + 5y^2$

Subtract : $5x^2 + y^2 - 3xy + 1$ **from** $6x^2 - 2xy + 3y^2$

Subtract : $-2x^2 - 5xy + 4y^2$ **from** $3x^2 + 2xy + 4y^2$

A

- $2\,a \times 5\,b = (2 \times 5) \times (a \times b) = 10\,a\,b$

B

- $(5\,x^2) \times (3\,x) = (5 \times 3) \times (x^2 \times x) = 15\,x^3$

C

$$2\,x\,(\,3\,x + 5\,y\,) = (2\,x \times 3\,x) + (2\,x \times 5\,y)$$
$$= 6\,x^2 + 10\,x\,y$$

$$\begin{array}{r} 3\,x + 5\,y \\ \times\ 2\,x \\ \hline \text{The product} = 6\,x^2 + 10\,x\,y \end{array}$$

Example 2 **Find by inspection the product of each of the following :**

$(2\,a + 3)\,(5\,a + 1)$

$$(2\,a+3)\,(5\,a+1) = \underset{\text{The first}}{\times} + \underset{\text{Product of means}}{\text{Product of}} + \underset{\text{Product of extremes}}{\text{Product of}} + \underset{\text{The second}}{\times}$$
$$= (2\,a \times 5\,a) + (3 \times 5\,a + 2\,a \times 1) + 3 \times 1$$
$$= 10\,a^2 + (15\,a + 2\,a) + 3$$
$$= 10\,a^2 + 17\,a + 3$$

Example 3 **Find the expansion of each of the following :**

1 $(3\,a+5)^2$ **2** $(2\,x-3\,y)^2$

Solution

1 $(3\,a + 5)^2 = (3\,a)^2 + (2 \times 3\,a \times 5) + (5)^2$
$= 9\,a^2 + 30\,a + 25$

2 $(2\,x - 3\,y)^2 = (2\,x)^2 - (2 \times 2\,x \times 3\,y) + (3\,y)^2$
$= 4\,x^2 - 12\,x\,y + 9\,y^2$

Example 4 **Find the product of each of the following :**

1 $(2\ell - 5)(2\ell + 5)$

2 $(5x + 3y)(5x - 3y)$

3 $(a^2 + 2b)(a^2 - 2b)$

4 $\left(\frac{1}{3}a - \frac{2}{5}b\right)\left(\frac{1}{3}a + \frac{2}{5}b\right)$

Solution

1 $(2\ell - 5)(2\ell + 5) = (2\ell)^2 - (5)^2 = 4\ell^2 - 25$

2 $(5x + 3y)(5x - 3y) = (5x)^2 - (3y)^2 = 25x^2 - 9y^2$

3 $(a^2 + 2b)(a^2 - 2b) = (a^2)^2 - (2b)^2 = a^4 - 4b^2$

4 $\left(\frac{1}{3}a - \frac{2}{5}b\right)\left(\frac{1}{3}a + \frac{2}{5}b\right) = \left(\frac{1}{3}a\right)^2 - \left(\frac{2}{5}b\right)^2 = \frac{1}{9}a^2 - \frac{4}{25}b^2$

Simplify : $(y-5)(y+2)$

Solution $(y \otimes y)\ (2 \otimes y\ -5 \otimes y)\ (-5 \otimes 2)$ $\equiv y^2 - 3y - 10$

y^2 $\quad 2y - 5y = -3y \quad -10$

Simplify to the simplest form : $(2x-3)(2x+3)+7$

Solution $(2x \otimes 2x)(3 \otimes -3) = 4x^2 - 9 + 7 = 4x^2 - 2$

Simplify : $(x+2)^2 + (x-2)(x+2)$

Solution $(x \otimes x) + (2 \otimes x \otimes 2)\ (2 \otimes 2) = x^2 + 4x + 4$

$(x \otimes x) \quad (2 \otimes -2) = x^2 \quad -4$

$2x^2 + 4x$

Find : $(2x-y)(2x+y)$ **Solution** $4x^2 - y^2$

Simplify : $(x+3)^2 - 9$, then find the numerical value when $x = 3$

Solution **The expression** $= x^2 + 6x + 9 - 9 = x^2 + 6x$

الثاني مرتين | الأول ف الثاني ف 2 | الاول مرتين **The numerical value** $= 3^2 + 6 \times 3 = 9 + 18 = 27$

$(3b-4)(3b+4)+5$, then find the numerical value of the result when $b = -2$

Solution The expression $= 9b^2 - 16 + 5 = 9b^2 - 11$

The numerical value $= 9 \times (-2)^2 - 11 = 9 \times 4 - 11$

$= 36 - 11 = 25$

Simplify to the simplest form : $(x+3)^2 - (x+3)(x-3)$

$= x^2 + 6x + 9 - (x^2 - 9) = \cancel{x^2} + 6x + 9 \cancel{- x^2} + 9 = 6x + 18$

Simplify : $(2a - 3)(2a + 3) + 7$, then find the value of the result when $a = 1$

Solution

The expression $= 4a^2 - 9 + 7 = 4a^2 - 2$

The numerical value $= 4 \times 1^2 - 2 = 4 - 2 = 2$

Simplify : $2a(a - 4b) + 4b(2a - 3b)$ **, then find the value of the result at :** $a = 2$, $b = -1$

Solution

The expression $= 2a^2 - 8ab + 8ab - 12b^2$

$= 2a^2 - 12b^2$

The numerical value $= 2 \times 2^2 - 12 \times (-1)^2$

$= 2 \times 4 - 12 \times 1 = 8 - 12 = -4$

Simplify to the simplest form : $(x - 5)^2 + 10x$

Solution $= x^2 \cancel{- 10x} + 25 \cancel{+ 10x} = x^2 + 25$

Find the product of : $(3x - 4y)(2x + 5y)$

$$
\begin{array}{l}
(3x - 4y) \\
\times \quad (2x + 5y) \\
\hline
(2x \otimes 3x)(2x \otimes -4y) \\
\quad (5x \otimes 3x)(5y \otimes -4y) \\
\hline
6x^2 + 7xy - 20y^2
\end{array}
$$

Simplify to the simplest form : $(x - 3)(x + 3) + 9$, then calculate the numerical value of the result when $x = 5$

Simplify : $3\,a\,(a-b)+4\,a\,(2\,a+b)$ in the simplest form.

Solution $3\,a^2-3\,a\,b+8\,a^2+4\,a\,b=11\,a^2+a\,b$

Simplify : $(x-3)\,(x+3)-9\,(x-1)$

(2) $x^2-9-9\,x+9=x^2-9\,x$

Use the distributive property to find : $\frac{17}{12}\times\frac{23}{45}+\frac{7}{12}\times\frac{23}{45}-2\times\frac{23}{45}$

Solution $\left(\frac{17}{12}+\frac{7}{12}-2\right)\times\frac{23}{45}=\left(\frac{24}{12}-2\right)\times\frac{23}{45}=$ zero

Simplify : $(2\,x+5)^2-4\,x^2-10\,x$

Solution $4\,x^2+20\,x+25-4\,x^2-10\,x=10\,x+25$

Simplify to the simplest form : $(x-3)\,(x+3)+9$, then calculate the numerical value of the result when $x=5$

Simplify to the simplest form : $(2\,x-3)\,(2\,x+3)+7$, then calculate the numerical value of the result when : $x=-1$

Simplify to the simplest form : $(x+2)^2-(x+2)\,(x-2)$

Simplify the following expression to its simplest form :
$(x-2)^2-(x+3)\,(x-3)+5\,(2\,x+1)$

Find by inspection method the product of : $(x-2)\,(x+2)$

Find the product of : $(2\,x-3\,y)\,(3\,x+7\,y)$

Find the product of : $(3\,x-4\,y)\,(2\,x+5\,y)$

Simplify to the simplest form : $(x+3)^2-(x+3)\,(x-3)$

Simplify to the simplest form :
$3\,(1-2\,a)-(a^2-5\,a+3)+2\,a\,(a+3)$, then find the numerical value when $a=2$

Simplify to the simplest form : $(x-5)^2+10\,x$

Simplify : $(y-5)\,(y+2)$

Example 1 **Find the quotient of dividing :**

$5a - 10a^2 + 6a^3 + 3$ **by** $3 + 2a^2 - 4a$ where the divisor $\neq 0$

Solution

$$\begin{array}{r|l} 2a^2 - 4a + 3 & 6a^3 - 10a^2 + 5a + 3 \\ \hline 3a + 1 & \ominus \quad \oplus \quad \ominus \\ & 6a^3 - 12a^2 + 9a \\ \hline & 2a^2 - 4a + 3 \\ & \ominus \quad \oplus \quad \ominus \\ & 2a^2 - 4a + 3 \\ \hline & 0\,0 \quad 0\,0 \quad 0\,0 \end{array}$$

Notice that :
Each of the dividend and the divisor is in a descending order according to the power of " a".

i.e. The quotient = $3a + 1$

Example 2 **Find the quotient of dividing :**

$x^3 + x + 10$ **by** $x + 2$ **where** $x \neq -2$

Solution

$$\begin{array}{r|l} x + 2 & x^3 + \quad x + 10 \\ \hline x^2 - 2x + 5 & \ominus \quad \ominus \\ & x^3 + 2x^2 \\ \hline & -2x^2 + \quad x + 10 \\ & \oplus \quad \oplus \\ & -2x^2 - 4x \\ \hline & 5x + 10 \\ & \ominus \quad \ominus \\ & 5x + 10 \\ \hline & 0\,0 \quad 0\,0 \end{array}$$

Notice that :
There is no term with x^2 in dividend , so we leave its place empty.

i.e. The quotient = $x^2 - 2x + 5$

Example 3 **If $(x - 1)$ is one of the factors of $(x^2 + 5x - 6)$, then find the other factor.**

Solution

The other factor is the quotient of dividing

$x^2 + 5x - 6$ by $(x - 1)$

i.e. The other factor is $(x + 6)$

$$\begin{array}{r|l} x - 1 & x^2 + 5x - 6 \\ \hline x + 6 & \ominus \quad \oplus \\ & x^2 - x \\ \hline & 6x - 6 \\ & \ominus \quad \oplus \\ & 6x - 6 \\ \hline & 0\,0 \quad 0\,0 \end{array}$$

Divide : $(x^2 + 5x + 6)$ **by** $(x + 2)$

$$\begin{array}{r|l} x+2 & x^2+5x+6 \\ & \ominus\ \ominus \\ & x^2+2x \\ \hline & 3x+6 \\ & \ominus\ \ominus \\ & 3x+6 \\ \hline & 0\quad 0 \end{array} \qquad x+3$$

The quotient $= x + 3$

$x^2 + 5x + 6$ **by** $x + 3$

$$\begin{array}{r|l} x+3 & x^2+5x+6 \\ & \ominus\ \ominus \\ & x^2+3x \\ \hline & 2x+6 \\ & \ominus\ \ominus \\ & 2x+6 \\ \hline & 0\quad 0 \end{array} \qquad x+2$$

The quotient $= x + 2$

Divide : $6x^2 + 13xy + 6y^2$ **by** $2x + 3y$

$$\begin{array}{r|l} 2x+3y & 6x^2+13xy+6y^2 \\ & \ominus\ \ominus \\ & 6x^2+9xy \\ \hline & 4xy+6y^2 \\ & \ominus\ \ominus \\ & 4xy+6y^2 \\ \hline & 0\quad 0 \end{array} \qquad 3x+2y$$

The quotient $= 3x + 2y$

$16x^2 - 24xy + 9y^2$ **by** $4x - 3y$

$$\begin{array}{r|l} 4x-3y & 16x^2-24xy+9y^2 \\ & \ominus\ \oplus \\ & 16x^2-12xy \\ \hline & -12xy+9y^2 \\ & \oplus\ \ominus \\ & -12xy+9y^2 \\ \hline & 0\quad 0 \end{array} \qquad 4x-3y$$

The quotient $= 4x - 3y$

Divide : $(x^2 - 5x + 6)$ **by** $(x - 3)$ (where $x \neq 3$)

Find the quotient of : $x^2 - 2x - 8$ **by** $(x - 4)$ (where $x \neq 4$)

Find the quotient of : $x^3 + 3x^2 - x - 3$ **by** $x^2 - 1$ (where $x^2 - 1 \neq 0$)

Divide : $6x^2 + 13xy + 6y^2$ **by** $2x + 3y$ (where $2x + 3y \neq 0$)

Divide : $6x^2y - 9xy^2 + 24xy$ **by** xy

Solution $\frac{6x^2y}{xy} - \frac{9xy^2}{xy} + \frac{24xy}{xy} = 6x + 9y\ 24$

Divide : $30x^3 - 25x^2 + 15x$ **by** $5x$ (where $x \neq 0$)

Solution $\frac{30x^3}{5x} - \frac{25x^2}{5x} + \frac{15x}{5x} = 6x^2 - 5x + 3$

Find the quotient of : $30a^2b^3 - 25a^3b^2 + 35ab$ **by** $5ab$

Solution $\frac{30a^2b^3}{5ab} - \frac{25a^3b^2}{5ab} + \frac{35ab}{5ab} = 6ab^2 - 5a^2b + 7$

Divide : $x^3y^3 - 4x^2y^2 + 6xy^2$ **by** xy (where : $xy \neq 0$)

Solution $\frac{x^3y^3}{xy} - \frac{4x^2y^2}{xy} + \frac{6xy^2}{xy} = x^2y^2 - 4xy + 6y$

The necessary condition to make $\frac{5}{x-3}$ a rational number is .....

(a) $x = -3$ (b) $x = 3$ (c) $x \neq 3$ (d) $x = 5$

$(a^2 + a) \div a =$ ..... (where $a \neq 0$)

(a) a (b) 0 (c) 2 a + 1 (d) a + 1

$\frac{3x}{7} - \frac{x}{7} =$ .....

(a) $\frac{2}{7}$ (b) $\frac{x}{7}$ (c) $\frac{2x}{7}$ (d) $2x$

Divide : $2x^3 + 11x^2 + 12x - 9$ **by** $x + 3$

Solution

$$
\begin{array}{r|l}
x+3 & 2x^2+5x-3 \\
\hline
2x^2+5x-3 & 2x^3+11x^2+12x-9 \\
 & \ominus\ 2x^3+6x^2 \\
\hline
 & 5x^2+12x-9 \\
 & \ominus\ \ominus \\
 & 5x^2+15x \\
\hline
 & -3x-9 \\
 & \oplus\ \ \oplus \\
 & -3x-9 \\
\hline
 & 0\ \ \ 0
\end{array}
$$

The quotient $= 2x^2 + 5x - 3$

Divide : $10x^4 - 5x^3$ **by** $5x^2$ (if $x \neq 0$)

Divide : $x^3y^3 - 4x^2y^2 + 6xy^2$ **by** xy (where : $xy \neq 0$)

(1) **Add :** $3x - 2y + 5$ **and** $2x + y - 3$

(2) **Divide :** $6x^3y^3 + 4xy^2$ **by** $2xy$ (where $xy \neq 0$)

Divide : $6x^3y^2 + 9x^2y^3$ **by** $3x^2y^2$ (where $x \neq 0$, $y \neq 0$)

Divide : $30x^3 - 25x^2 + 15x$ **by** $5x$ (where $x \neq 0$)

Find the quotient of : $(x^2 + 5x + 6)$ **by** $(x + 2)$ (where $x \neq -2$)

Find the quotient of : $(x^3 - 6x^2 + 11x - 6)$ **by** $(x - 3)$ (where $x \neq 3$)

Divide : $2x^3 + 11x^2 + 12x - 9$ **by** $x + 3$ (where $x \neq -3$)

Find the quotient of : $13x + 15 + 2x^2$ **by** $x + 5$ (where $x \neq -5$)

Find the value of k which makes the expression : $2x^3 - x^2 - 5x + k$ **divided by** $2x - 3$

Find the quotient : $6x^2 - xy - 15y^2$ **by** $2x + 3y$ (where $2x + 3y \neq 0$)

Factorize by using (H.C.F) : $3\,a\,(a-2\,b)+7\,b\,(a-2\,b)$

Solution $(a-2\,b)\,(3\,a+7\,b)$

Factorize by taking the H.C.F : $15\,x\,y^3+20\,x^2\,y-25\,x\,y$

Solution $5\,x\,y\,(3\,y^2+4\,x-5)$

Factorize the expression by identifying the H.C.F : $12\,y^3+18\,y^2$

Solution $6\,y^2\,(2\,y+3)$

If $x+4=4$ **, then find :** $x\,(x+4)+4\,(4+x)$

Where $x+4=4$, then $x=0$
, then the value $=0\times(0+4)+4\times(4+0)$
$=0\times4+4\times4=0+16=16$

$(x+4)\,(x+4)=4\times4=16$

Factorize by identifying the H.C.F : $3\,x^2+15\,x\,y$

Solution $3\,x\,(x+5\,y)$

Subtract : $-5\,x$ **from** $3\,x$ Solution $3\,x+5\,x=8\,x$

Factorize by identifying the H.C.F. : $12\,x^3+8\,x^2-4\,x$

Solution $4\,x\,(3\,x^2+2\,x-1)$

By using the highest common factor , find the result of : $(17)^2-8\times17+17$

Solution $17\,(17-8+1)=17\times10=170$

$\frac{6}{37}\times7+\frac{6}{37}\times5+\frac{6}{37}\times(-11)$ Solution $\frac{6}{37}\left(7+5+(-11)\right)=\frac{6}{37}\times1=\frac{6}{37}$

Factorize by identifying the H.C.F : $3\,a\,(a-2\,b)-6\,b\,(a-2\,b)$

, then find the numerical value of the result when $a-2\,b=\left|\frac{-1}{3}\right|$

Solution

The expression $=3\,(a-2\,b)\,(a-2\,b)=3\,(a-2\,b)^2$

The numerical value $=3\times(\frac{1}{3})^2=3\times\frac{1}{9}=\frac{1}{3}$

Factorize by identifying the H.C.F : $6\,x^4\,y^3-12\,x^3\,y^4+2\,x^3\,y^3$

Solution $2\,x^3\,y^3\,(3\,x-6\,y+1)$

Factorize by taking out the H.C.F : $27\,x^3-18\,x^2+6\,x$

Solution $3\,x\,(9\,x^2-6\,x+2)$

Simplify : $3\,(1-2\,x)-(x^2-5\,x+3)+2\,x\,(x+3)$

, then find the numerical value of the result when $x=-1$

Solution

$3-6\,x-x^2+5\,x-3+2\,x^2+6\,x=x^2+5\,x$

at $x=-1$

The numerical value $=(-1)^2+5\,(-1)=1-5=-4$

Factorize by identifying the H.C.F : $a\,(a-2\,b)-2\,b\,(a-2\,b)$

Solution $(a-2\,b)\,(a-2\,b)=(a-2\,b)^2$

Factorize by identifying the H.C.F : $a\,(a-2\,b)-2\,b\,(a-2\,b)$

, then find the numerical value of the result when $(a-2\,b)=\frac{1}{3}$

Solution $(a-2\,b)\,(a-2\,b)=(a-2\,b)^2$

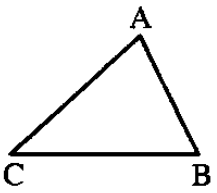
at $(a-2\,b)=\frac{1}{3}$ The numerical value $=\left(\frac{1}{3}\right)^2=\frac{1}{9}$

Sheet (5)
Congruent triangles

We know that any triangle has three sides and three angles which are known as the six elements of the triangle.

For example :

Δ ABC has three sides which are : $\overline{AB}$, $\overline{BC}$ and $\overline{AC}$ and it has three angles which are : $\angle A$, $\angle B$ and $\angle C$



Therefore :

The two triangles are congruent if each element of the 6 elements of one of them is congruent to the corresponding element in the other triangle and vice versa.

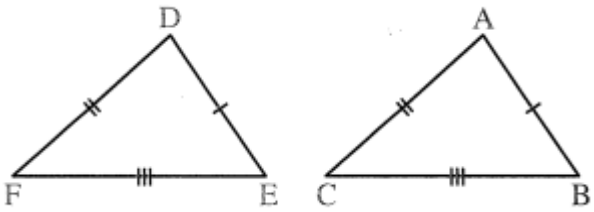
- To test whether two triangles are congruent or not, you don't need to test all the three sides and the three angles.

The cases of congruence of two triangles

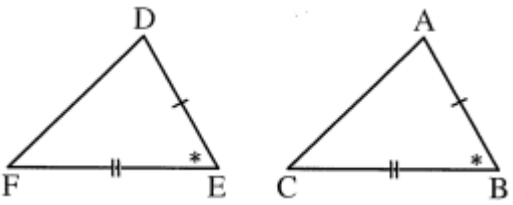
Case (1)	Case (2)	Case (3)	Case (4)
Two sides and the included angle	Two angles and one side	Three sides	Hypotenuse and one side in the right-angled triangle
S. A. S.	A. S. A.	S. S. S.	R. H. S.
Two triangles are congruent if two sides and the included angle of one triangle are congruent to the corresponding parts of the other triangle	Two triangles are congruent if two angles and the side drawn between their vertices of one triangle are congruent to the corresponding parts of the other triangle	Two triangles are congruent if each side of one triangle is congruent to the corresponding side of the other triangle	Two right-angled triangles are congruent if the hypotenuse and a side of one triangle are congruent to the corresponding parts of the other triangle

Remark

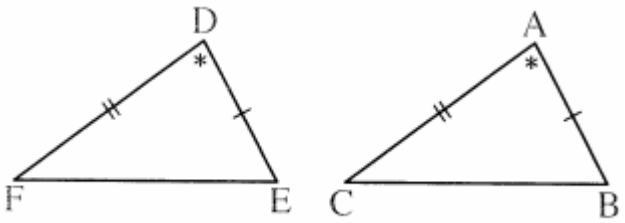
If each angle of one triangle is congruent to the corresponding angle of the other triangle , it is not necessary for the two triangles to be congruent.



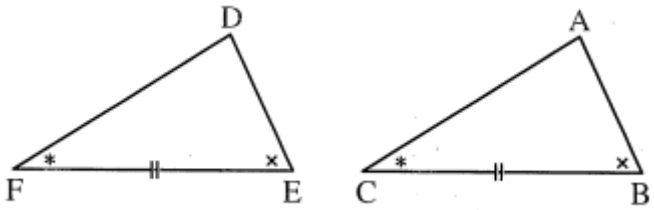
Prove that Δ A B C ≡ Δ D E F



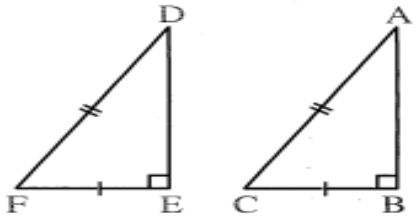
Prove that Δ A B C ≡ Δ D E F



Prove that Δ A B C ≡ Δ D E F



Prove that Δ A B C ≡ Δ D E F



Prove that Δ A B C ≡ Δ D E F

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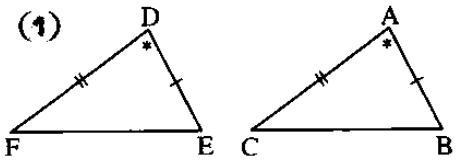
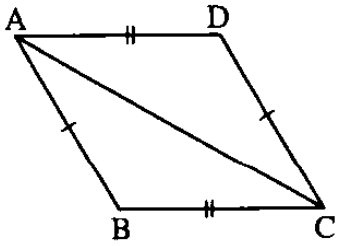
.....

[1] In each of the following figures, show if the two triangles are congruent or not. If they are congruent, name the case of congruence. If they aren't congruent, give reason. (given that the similar signs denoted the congruency of the elements marked by these signs).

(1)



(2)



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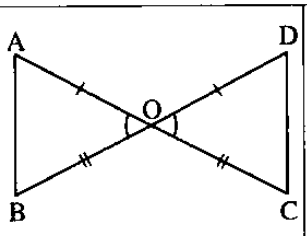

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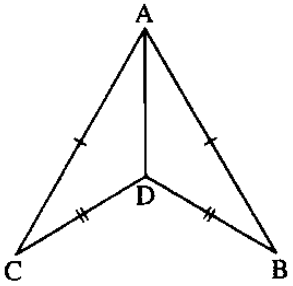

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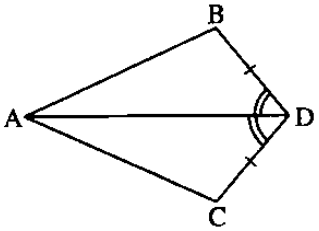

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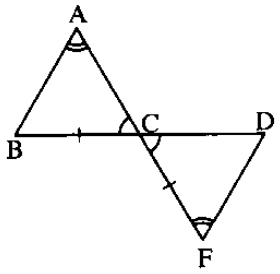

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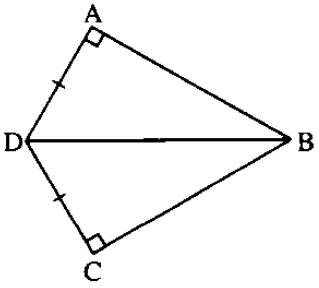

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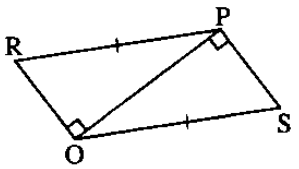

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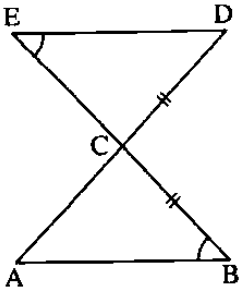

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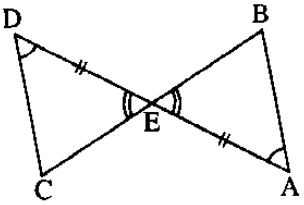

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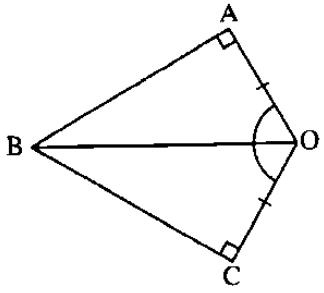

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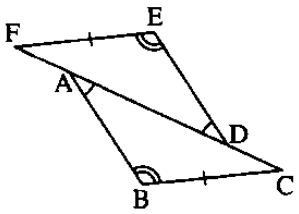

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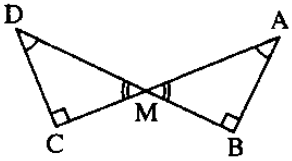

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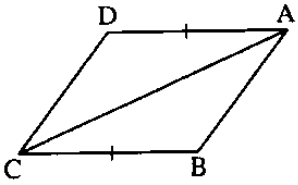

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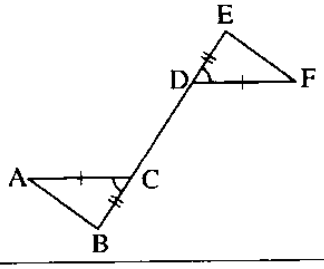

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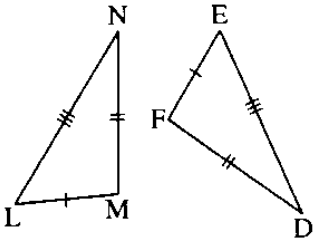

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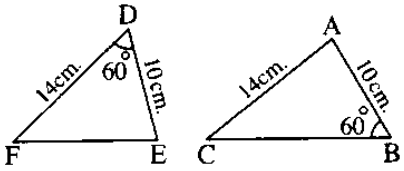

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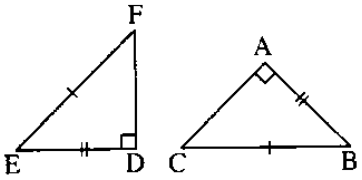

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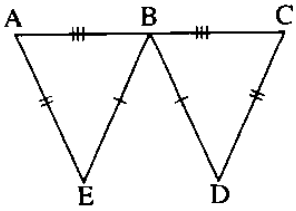

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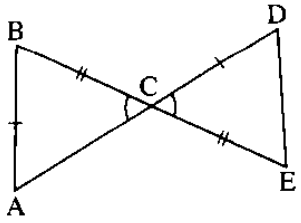

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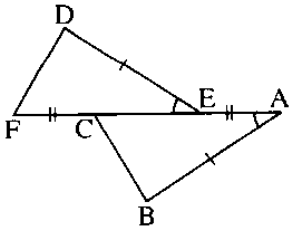

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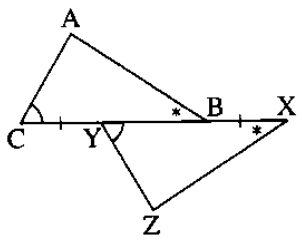

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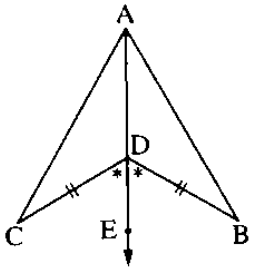

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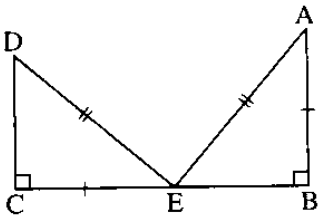

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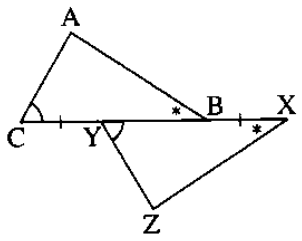

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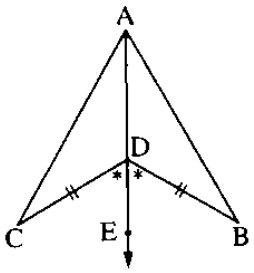

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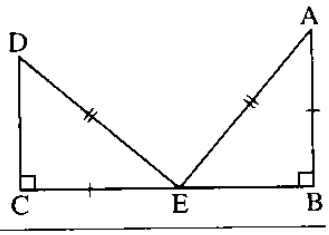

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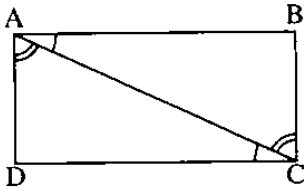

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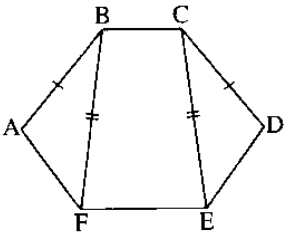
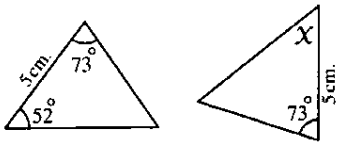


[2] Answer the following:

(1) **In the opposite figure:**

These triangles are congruent

, then x = ...°



(2) **In the opposite figure:**

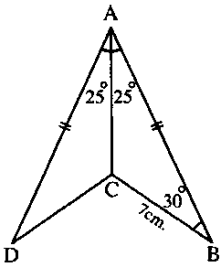
If : AB = AD , BC = 7 cm. , m (∠ BAC) = m (∠ DAC) = 25°

and m (∠ B) = 30°

Complete the following :

(1) Δ ACB ≡ Δ ..... (2) m (∠ D) = ...°

(3) CD = ... cm. (4) m (∠ ACD) = ...°

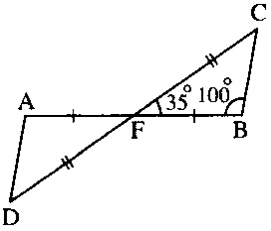


(3) **In the opposite figure:**

If : $\overline{CD} \cap \overline{BA} = \{F\}$, FA = FB , CF = FD ,

m (∠ CFB) = 35° and m (∠ B) = 100° ,

then m (∠ D) = ...°



(4) **In the opposite figure:**

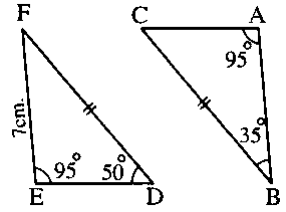
If : BC = FD , m (∠ A) = m (∠ E) = 95° ,

m (∠ B) = 35° , m (∠ D) = 50° and FE = 7 cm.

Complete the following :

(1) m (∠ C) = ...° (2) m (∠ F) = ...° (3) Δ ABC ≡ .....

(4) $\overline{AC}$ ≡ ..... (5) AB = ... cm.



(5) **In the opposite figure:**

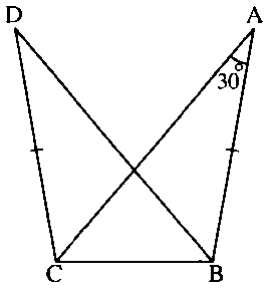
If : AB = DC , AC = DB and m (∠ A) = 30°

Complete the following :

(1) Δ ABC ≡ Δ .....

(2) m (∠ D) = ...°

(3) m (∠ DBC) = m (∠ .....)



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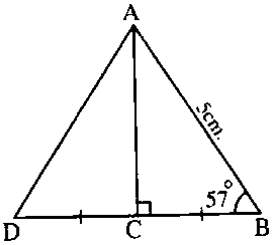
(6) **In the opposite figure:**

C is the midpoint of $\overline{BD}$, $\overline{AC} \perp \overline{BD}$,

AB = 5 cm. and m (∠ B) = 57°

Find : (1) The length of $\overline{AD}$

(2) m (∠ DAC)



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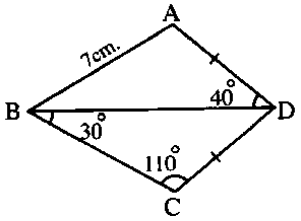
(7) **In the opposite figure:**

AD = DC , m (∠ ADB) = 40° , m (∠ DBC) = 30° ,

m (∠ BCD) = 110° and AB = 7 cm.

Find : (1) The length of $\overline{BC}$ (2) m (∠ BAD)



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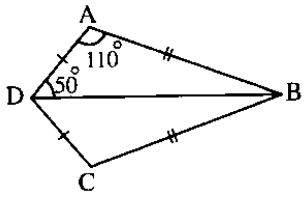
(8) **In the opposite figure:**



$BA = BC$, $DA = DC$,

$m(\angle ADB) = 50°$ and

$m(\angle BAD) = 110°$

Find : $m(\angle ABC)$

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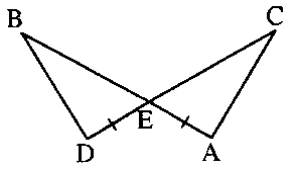
(9) **In the opposite figure:**



$\overline{AB} \cap \overline{CD} = \{E\}$, $AE = ED$ and $\angle A \equiv \angle D$

Is $\Delta ACE \equiv \Delta DBE$? Why ?

Prove that : $CE = EB$

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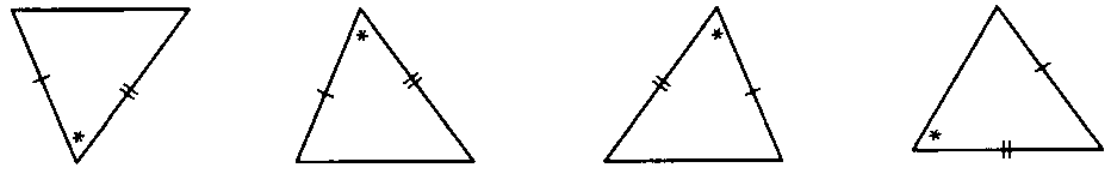
[3] Choose the correct answer:

(1) The following triangles are congruent except .....

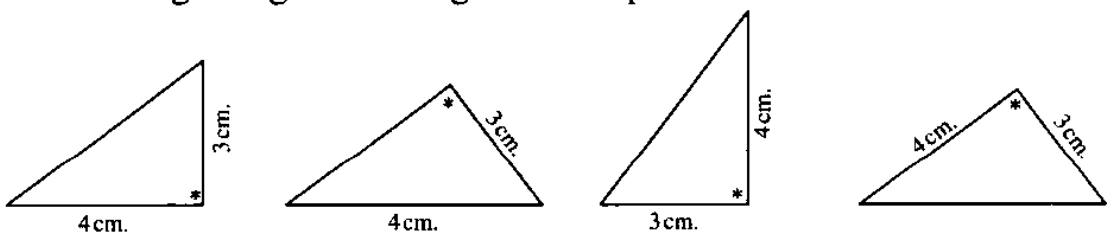


(a) (b) (c) (d)

(2) The following triangles are congruent except .....

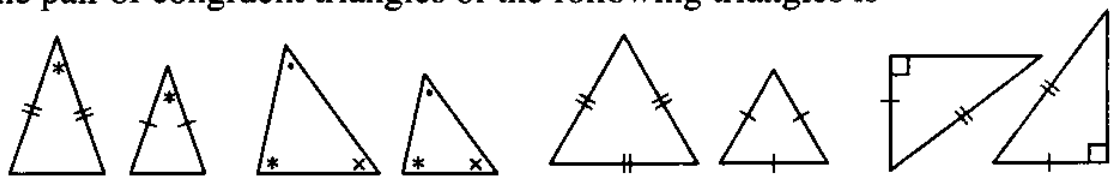
(a) (b) (c) (d)

(3) The following triangles are congruent except .....



(a) (b) (c) (d)

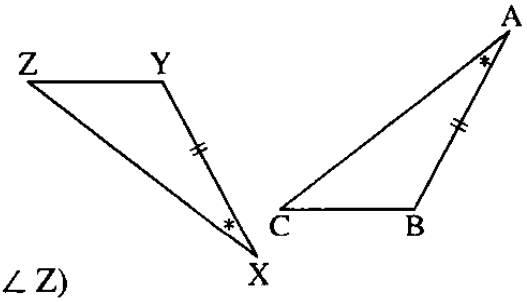
(4) The pair of congruent triangles of the following triangles is .....



(a) (b) (c) (d)

(5) **In the opposite figure :**

The necessary and enough condition which makes the two triangles ABC and XYZ be congruent is .....



(a) BC = YZ (b) AC = XZ

(c) m (∠ C) = m (∠ Z) (d) m (∠ B) = m (∠ Z)

[4] Complete the following:

(1) If : $\Delta ABC \equiv \Delta XYZ$, $m(\angle A) = 50°$ and $m(\angle B) = 60°$, then : $m(\angle Z) =$ .....°

(2) If : $\Delta ABC \equiv \Delta LMN$, $m(\angle L) = 40°$ and $m(\angle B) = 90°$, then : $m(\angle C) =$ .....°

(3) If : $\Delta ABC \equiv \Delta XYZ$ and $m(\angle A) + m(\angle B) = 120°$, then : $m(\angle Z) =$ .....°

(4) If : $\Delta ABC \equiv \Delta DEF$ and $m(\angle C) = 90°$, then : $m(\angle D) + m(\angle E) =$ .....°

(5) If : $\Delta ABC \equiv \Delta XYZ$, the perimeter of $\Delta ABC = 12$ cm. , $XY = 4$ cm. and $YZ = 5$ cm. , then : $AC =$ .....

(6) Any two triangles are congruent if each ..... is congruent to its corresponding side in the other triangle.

(7) Any two triangles are congruent if two angles and ..... in one of the triangles are congruent to their corresponding elements in the other.

(8) The diagonal of the rectangle divides its surface into two ..... triangles.

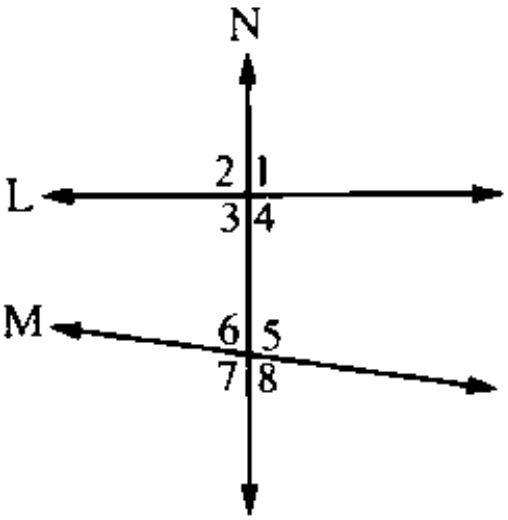
(9) If $\Delta ABC \equiv \Delta XYZ$, then $AB =$ ..... and $m(\angle Z) = m(\angle$ .....)

(10) If : $AB = LM$, $BC = MN$ and $m(\angle B) = m(\angle M)$, then the two triangles ..... and ..... will be congruent.

Sheet (6)
Parallelism

Angles Formed from two straight lines and a transversal:

If a straight line N cuts two straight lines L and M as shown in the opposite figure, then we get eight angles.

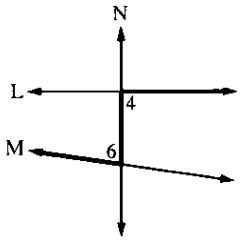


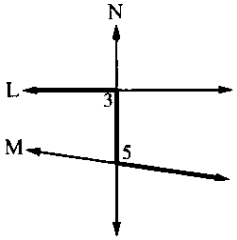
We can classify these angles into pairs of angles:

- Alternate angles.
- Corresponding angles.
- Interior angles on the same side of the transversal.

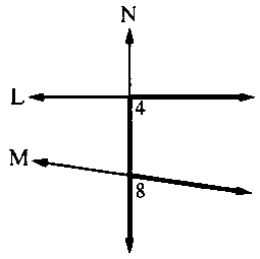
As follows

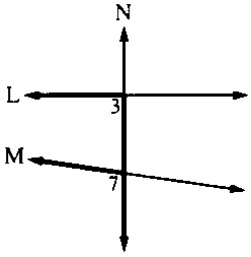
(1) Pairs of alternate angles:

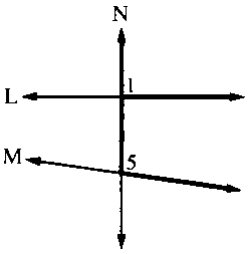


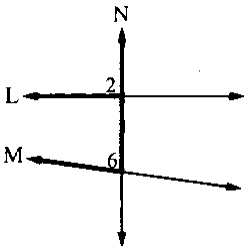


(2) Pairs of corresponding angles:

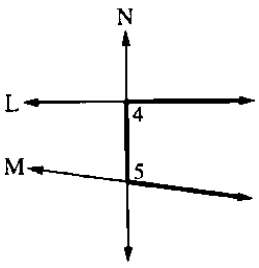


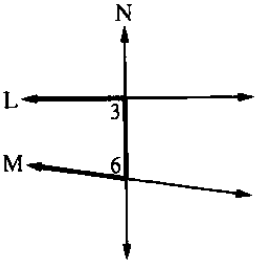






(3) Pairs of interior angles on the same side of the transversal





Relation between pairs of angles formed from two parallel straight lines and a transversal to them

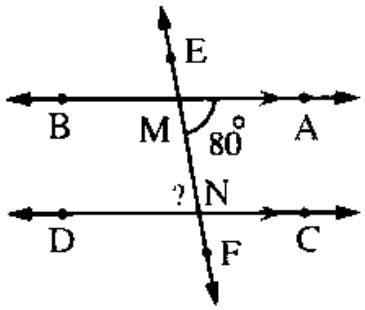
If a straight line intersects two parallel lines, then:

(1) Each two alternate angles are equal in measure.

(2) Each two corresponding angles are equal in measure.

(3) Each two interior angles in the same side of the transversal are supplementary.

In each of the following figures, find the measure of the angle which is marked by (?) giving reason:



(1)

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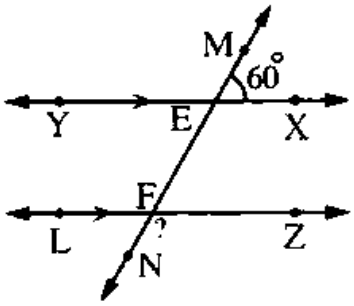

(2)

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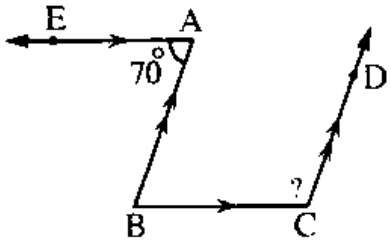

(3)

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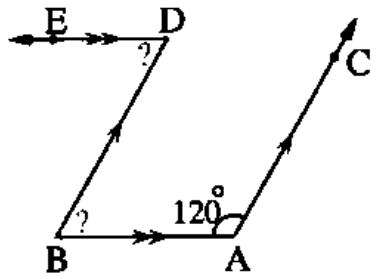
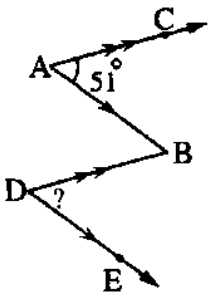
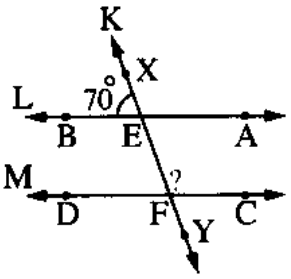


(4)



(5)



(6)

The condition of parallelism of two straight lines

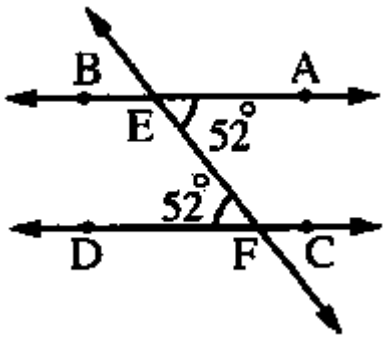
The two straight lines are parallel if a third straight line intersects them (as a transversal) and one of the following cases satisfied:

(1) Two alternate angles have the same measure.

(2) Two corresponding angles have the same measure.

(3) Two interior angles in the same side of the transversal are supplementary.

In each of the following figures, why is $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$?



(1)

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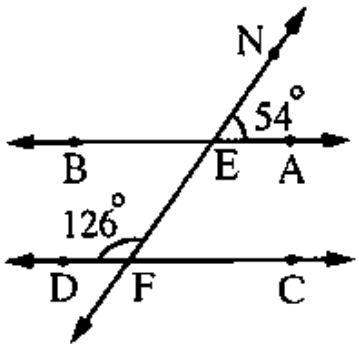

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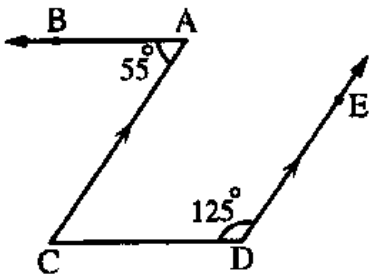

(3)

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Geometric facts

(1) The perpendicular to one of two parallel straight lines is perpendicular to the other.

(2) If two straight lines are perpendicular to a third one, then the two straight lines are parallel.

(3) If two straight lines are parallel to a third one, then the two straight lines are parallel.

(4) If parallel straight lines divide a straight line into segments of equal lengths, then they divide any other line into segments of equal lengths.

If L_1 // L_2 // L_3 // L_4,

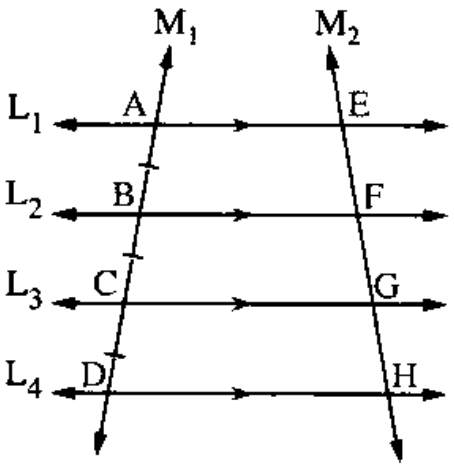
and M_1 and M_2 are two transversal

in which:

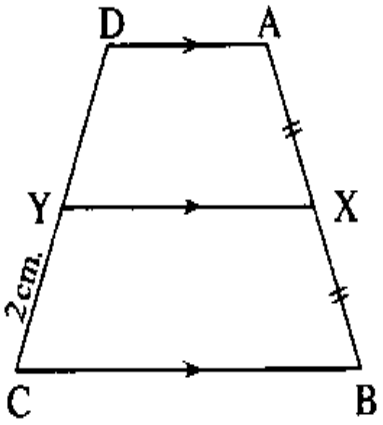
AB = BC = CD,

then:

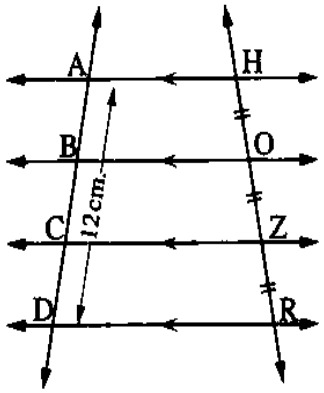
EF = FG = GH



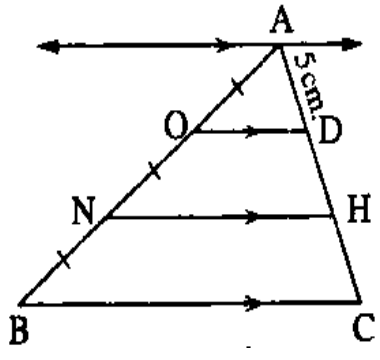
Complete using the given shown in the following figures:



DY = ... cm



AC = ... cm



AC = ... cm

[1] Choose the correct answer:

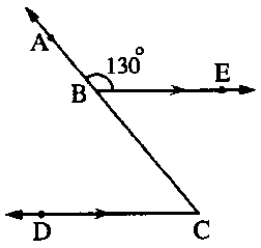
(1) In the opposite figure:

$B \in \overline{AC}$, $\overrightarrow{BE} // \overrightarrow{CD}$ and m (∠ ABE) = 130°

Then m (∠ C) = ...

(a) 130° (b) 40°

(c) 50° (d) 90°



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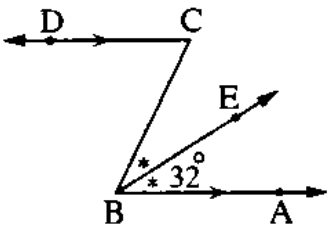
(2) In the opposite figure:

$\overrightarrow{BE}$ bisects ∠ ABC , $\overrightarrow{BA} // \overrightarrow{CD}$ and

m (∠ ABE) = 32° , then m (∠ C) = ...

(a) 32° (b) 64°

(c) 60° (d) 80°



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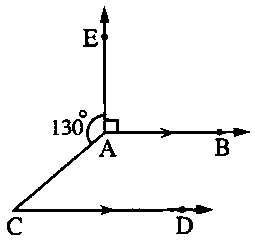
(3) In the opposite figure:

$\overrightarrow{AB} // \overrightarrow{CD}$, m (∠ EAC) = 130°

and m (∠ EAB) = 90° , then m (∠ C) = ...

(a) 90° (b) 130°

(c) 140° (d) 40°



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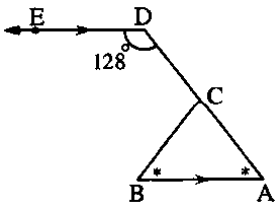
(4) In the opposite figure:

$\overline{AB} // \overrightarrow{DE}$, m (∠ D) = 128°,

m (∠ A) = m (∠ B) and $C \in \overline{AD}$, then m (∠ B) = ...

(a) 64° (b) 128°

(c) 52° (d) 26°



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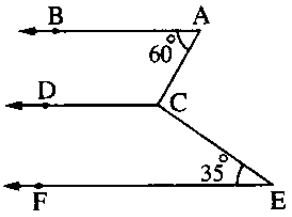
(5) In the opposite figure:

$\overrightarrow{AB} // \overrightarrow{CD}$, $\overrightarrow{AB} // \overrightarrow{EF}$, m (∠ A) = 60° and

m (∠ E) = 35° , then m (∠ ACE) = ...

(a) 60° (b) 35°

(c) 95° (d) 85°



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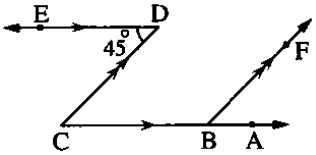
(6) In the opposite figure:

m (∠ D) = 45° , $\overrightarrow{DE} // \overrightarrow{CA}$ and

$\overline{CD} // \overrightarrow{BF}$, then m (∠ ABF) = ...

(a) 45° (b) 90°

(c) 135° (d) 40°



(7) **In the opposite figure:**

$\overline{AX} // \overline{BY} // \overline{CE} // \overline{DF}$,

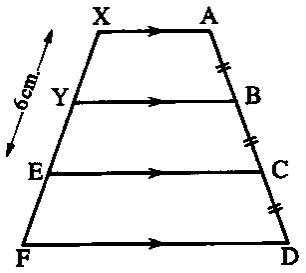
AB = BC = CD

and XE = 6 cm.

, then the length of $\overline{YF}$ = ...

(a) 3 cm. (b) 6 cm.

(c) 12 cm. (d) 9 cm.



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(8) **In the opposite figure:**

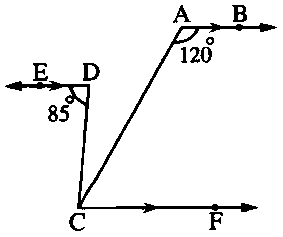
$\overrightarrow{AB} // \overrightarrow{CF} // \overrightarrow{DE}$,

m (∠ A) = 120° and m (∠ D) = 85° ,

then m (∠ ACD) = ...

(a) 60° (b) 85°

(c) 25° (d) 120°



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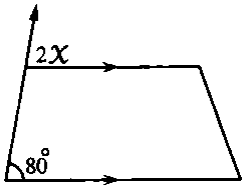
(9) **In the opposite figure:**

What is the value of x ?

(a) 40° (b) 60°

(c) 80° (d) 100°



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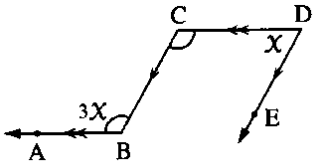
(10) **In the opposite figure:**

$\overline{CD} // \overrightarrow{BA}$, $\overrightarrow{DE} // \overline{CB}$

, then : x = ...

(a) 60° (b) 45°

(c) 120° (d) 90°



[2] Complete:

(1) 🕮 The straight line which is perpendicular to one of two parallel straight lines is ..... to the other straight line in the plane.

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(2) 🕮 If two straight lines are parallel to a third straight line , then they are .....

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(3) If a straight line cuts two parallel straight lines , then each two alternate angles are .....

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(4) If a straight line cuts two parallel straight lines , then each two corresponding angles are .....

(5) If a straight line cuts two parallel straight lines , then each two interior angles in the same side of the transversal are .....

(6) If a straight line cuts two straight lines and there are two corresponding angles having the same measure , then the two straight lines are .....

(7) If a straight line cuts two straight lines and there are two alternate angles having the same measure , then the two straight lines are .....

(8) If a straight line cuts two straight lines and there are two interior angles in the same side of the transversal are supplementary , then the two straight lines are .....

(9) If a straight line cuts several parallel lines and the intercepted parts of this transversal between these parallel straight lines are equal in length , then the intercepted parts for any transversal are .....

[3] Answer the following:

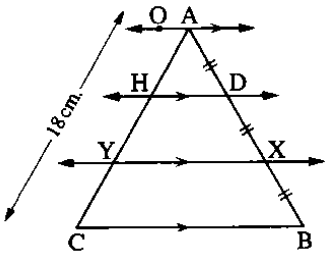
(1) In the opposite figure:

$\overleftrightarrow{AO} // \overleftrightarrow{HD} // \overleftrightarrow{YX} // \overline{CB}$

, AD = DX = XB

and AC = 18 cm.

Find the length of $\overline{AY}$

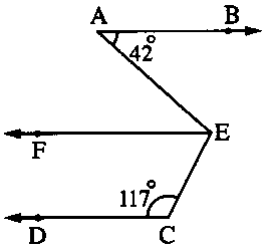


(2) In the opposite figure:

$\overrightarrow{AB} // \overrightarrow{CD}$, $\overrightarrow{EF} // \overrightarrow{CD}$

, $m(\angle A) = 42°$ and $m(\angle C) = 117°$

Determine : $m(\angle AEC)$



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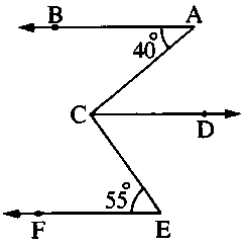
(3) In the opposite figure:

$m(\angle A) = 40°$, $m(\angle E) = 55°$

$\overrightarrow{AB} // \overrightarrow{EF}$ and $\overrightarrow{AB} // \overrightarrow{CD}$

Find : $m(\angle ACE)$



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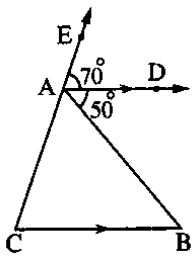
(4) **In the opposite figure:**

$\overrightarrow{AD} // \overrightarrow{BC}$, $E \in \overrightarrow{CA}$,

m (∠ DAE) = 70° and m (∠ DAB) = 50°

Find the measures of the triangle ABC



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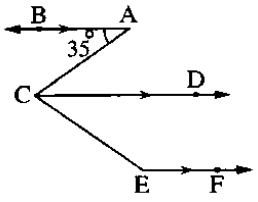
(5) **In the opposite figure:**

$\overrightarrow{AB} // \overrightarrow{CD} // \overrightarrow{EF}$, m (∠ A) = 35° and

$\overrightarrow{CD}$ bisects ∠ ACE

Find : (1) m (∠ DCE) (2) m (∠ CEF)



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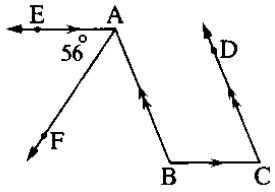
(6) In the opposite figure:

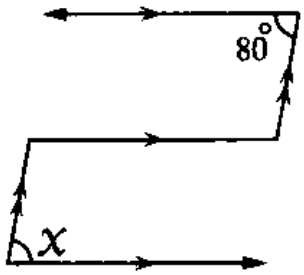
$\overrightarrow{AE} // \overrightarrow{CB}$, $\overrightarrow{BA} // \overrightarrow{CD}$,

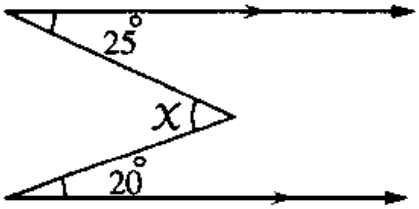
$\overrightarrow{AF}$ bisects $\angle BAE$ and $m(\angle EAF) = 56°$

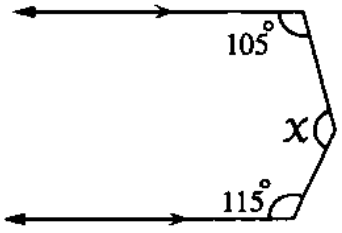
Find : $m(\angle C)$

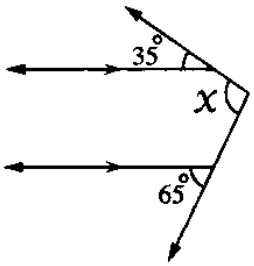


[4] Find the value of x:






105°
x
115°


35°
x
65°

FIRST ALGERBA

Q1: Choose the correct answer:

1) If $\frac{4}{7}$ x y = $\frac{4}{7}$, then y = ...

(a) 1 (b) zero (c) 4 (d) 7

2) The number that has no multiplicative inverse is .....

(a) 1 (b) zero (c) -1 (d) 2

3) If $\frac{x}{y} = \frac{2}{3}$, then $\frac{3x}{2y}$ = ...

(a) 1 (b) $\frac{1}{3}$ (c) $\frac{3}{2}$ (d) $\frac{9}{4}$

4) If $\frac{x}{y}$ = 70, then $\frac{x}{2y}$ = ...

(a) 35 (b) 68 (c) 72 (d) 140

5) If $\frac{x}{|4|}$ = 3, then x = ...

(a) 4 (b) 8 (c) 12 (d) ±12

6) If $\frac{2}{5}$ x = 10, then $\frac{1}{5}$ x = ...

(a) 1 (b) zero (c) 4 (d) 5

7) The number that lies in the middle of the way between $\frac{1}{8}$ and $\frac{7}{8}$ is .....

(a) $\frac{1}{4}$ (b) $\frac{3}{8}$ (c) $\frac{1}{2}$ (d) 1

8) If the algebraic term: $9\,xy^n$ is of third degree, then n = ...

(a) 1 (b) 2 (c) 3 (d) 4

9) If $5x^m + 2x^n = 7x^6$, then m + n = ...

(a) 3 (b) zero (c) 12 (d) 8

10) 4 x increases (- 4 x) by .....

(a) 8 x (b) zero (c) -8 x (d) 16 x

FIRST ALGERBA

11) $\frac{x}{y} = 1$, then 2x - 2y = ...

(a) 1 (b) 2 (c) -2 (d) zero

12) The algebraic term $4 a^2 y^2$ is of the ..... degree.

(a) second (b) third (c) fifth (d) fourth

13) The number that lies at half distance between $\frac{1}{3}$ and $\frac{5}{9}$ is .....

(a) $\frac{2}{3}$ (b) $\frac{3}{4}$ (c) $\frac{4}{5}$ (d) $\frac{4}{9}$

14) Multiplicative inverse of the number $(\frac{-1}{3})^0$ is .....

(a) 2 (b) -2 (c) 1 (d) -1

15) The perimeter of the rectangle whose dimensions are 8x , 5x is .....

(a) $40 x^2$ (b) 13 x (c) 40 x (d) 26 x

16) The additive inverse of X - 5 is .....

(a) X - 5 (b) -X - 5 (c) -X + 5 (d) 5

Q2: Complete the following:

1) 3 a + 4 b decreases than 5 b + 3 a by .....

2) $\frac{y^5}{y^3} + y^2$ = ... , $y \neq 0$

3) The coefficient of the algebraic expression $(-2)^3$ ..... and its degree is .....

4) $2 m^2$ + ... = zero

5) If 4 x - y = 11, y = 3 x , then x = ...

6) 4 x decreases 7 x by .....

7) The degree of the absolute term in any algebraic expression is .....

8) $5 a^2 b$ - ..... = $7 a^2 b$

9) The rational number $\frac{a - 1}{7}$ has a multiplicative inverse if a ≠ .....

FIRST ALGERBA

Q3: Answer the following:

1) Use the distribution property to find the value of: $\frac{5}{7} \times 3 + \frac{5}{7} \times 5 - \frac{5}{7}$

2) Find the value of: $(\frac{3}{5} \div \frac{2}{5}) \times \frac{2}{3}$

3) Find the rational number lying at on third of the way between $\frac{4}{7}$, $1\frac{3}{4}$ from the side of the smaller number.

4) Subtract: $5a + 3b - 1$ from $5a - 3b - 1$

5) The sum of: $3x^2 - 4x + 3$ and $-x^2 + 3x - 3$

6) If $x = \frac{-1}{3}$, $y = \frac{3}{4}$ and $z = -3$, Find the value of: $xy + yz$

7) Subtract: $5x^2 - 4x + 11$ from $3x^2 + 5x$

8) Use the distribution property to find the value of: $\frac{3}{7} \times \frac{5}{6} + \frac{3}{7} \times \frac{7}{6} + \frac{3}{7}$

9) Reduce the following algebraic expression to its simplest form:

$a^2 + 3a - 4 + 4a^2 - 5a + 1$

10) Add $3x^2 - 5 + 2x$, $x + 5x^2 + 7$ and $-4x^2 - 3$,Then find the numerical value of the result when: $x = 2$

"The only way to Learn mathematics is to do mathematics"

SECOND GEOMETRY

Q1: Choose the correct answer:

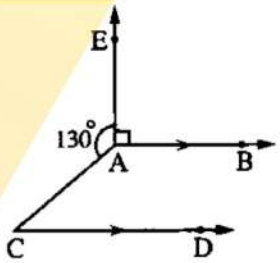
1) If L_1 and L_2 are to coplanar straight lines where $L_1 \cap L_2 = \emptyset$,
Then L_1 and L_2 are .....

(a) intersecting (b) perpendicular (c) parallel (d) coincident

2) If $\triangle ABC \equiv \triangle LMN$, then , $m(\angle B) = m(\angle \ldots\ldots)$

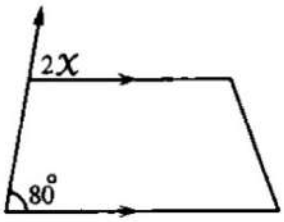
(a) LMN (b) MNL (c) LNM (d) NLM

3) In the opposite figure:
AB // CD, $m(\angle EAC) = 130^\circ$ and $m(\angle EAB) = 90^\circ$
then $m(\angle C) = \ldots\ldots$



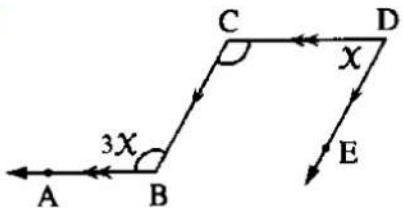
(a) 90° (b) 40°
(c) 130° (d) 140°

4) In the opposite figure:
What the value of x?



(a) 40° (b) 60°
(c) 80° (d) 100°

5) In the opposite figure:
CD // BA , DE // CB, then: x = ...



(a) 60° (b) 45°
(c) 120° (d) 90°

6) The two straight line perpendicular to a third straight line is the same plane are .....

(a) perpendicular (b) intersecting (c) parallel (d) coincident

SECOND GEOMETRY

7) If $\triangle ABC \equiv \triangle LMN$, $m(\angle A) = 50^\circ$, $m(\angle M) = 60^\circ$, $m(\angle C)$ = ...

(a) 60° (b) 50° (c) 70° (d) 10°

8) If $\triangle ABC \equiv \triangle LMN$, then AC = ...

(a) MN (b) LN (c) LM (d) AB

9) If two triangle ABC and XYZ are congruent, then .....

(a) BC = XZ (b) YX = CA (c) ZY = CB (d) AB = YZ

10) If L_1 and L_2 are to coplanar straight lines, $L_1 \perp L_3$ and $L_2 \perp L_3$ then .....

(a) $L_1 // L_2$ (b) $L_1 \perp L_2$ (c) L_1 intersects L_2 (d) L_1 is coincides L_2

11) If L_1 and L_2 are to coplanar straight lines, $L_1 // L_2$, $L_2 \perp L_3$
then , L_1 ..... L_3

(a) $\perp$ (b) // (c) = (d) $\equiv$

12) If $\triangle ABC \equiv \triangle XYZ$ and $m(\angle X) + m(\angle Z) = 140^\circ$, $m(\angle B)$ = ...

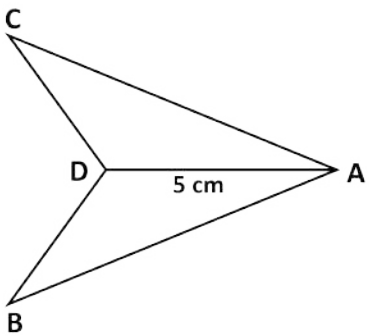
(a) 70° (b) 220° (c) 40° (d) 140°

13) If $\triangle ABC \equiv \triangle XYZ$ and $m(\angle A) + m(\angle B) = 130^\circ$, $m(\angle Z)$ = ...

(a) 50° (b) 65° (c) 130° (d) 180°

14) If $\triangle ABD \equiv \triangle ACD$, AD = 5 cm, The perimeter of the figure ABDC = 30 cm, Then the perimeter of $\triangle ABD$ = ... cm

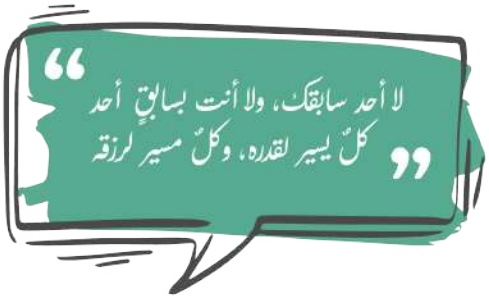
(a) 35 (b) 15
(c) 30 (d) 20



SECOND GEOMETRY

Q2: Complete the following:

1) The two right-angled triangles are congruent if .....
2) ABCD is a parallelogram, m(∠A) = 60° , then m(∠B) = ...
3) The diagonal of the rectangle divides its surface into two ..... triangles.
4) If two straight lines are parallel to a third straight line, then they are .....
5) The straight line that is perpendicular to one of two parallel lines in the same plane is ..... to the other.
6) The two triangles are congruent if two sides and ..... are congruent with corresponding parts in the other triangle.
7) If straight line intersects two parallel straight lines, then each two alternate angles are .....
8) If AB ∩ CD = ∅, in the same plane, then .....
9) If a straight line cuts two parallel straight lines, then each two interior angles are .....
10) If a straight line cuts two lines and there are two interior angles in the same side of the transversal are supplymentray, then the two straight lines are .....



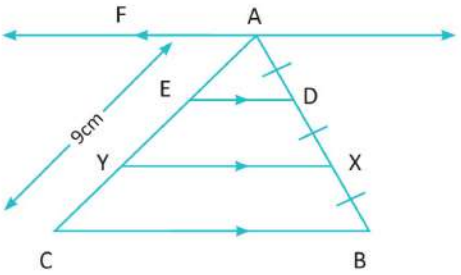
SECOND GEOMETRY

Q3: Answer the following:

1) In the opposite figure:

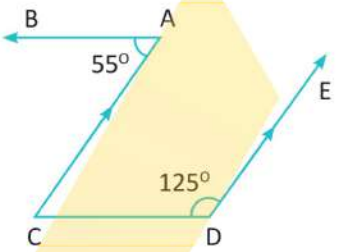
$\overleftrightarrow{AF} // \overline{DE} // \overline{XY} // \overline{BC}$, $\overline{AD} = DX = XB$, AC = 9 cm.

Find: The length of AY



2) If $\overline{DE} // \overline{CA}$, m(∠ D) = 125°, m(∠ A) = 55o

Find m(∠ C)

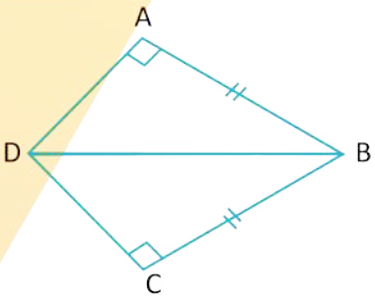


3) In the opposite figure:

m(∠A) = m(∠C) = 90°, AB = BC = 5 cm, AD = 3 cm.

a) Prove that: △ABD ≡ △CBD

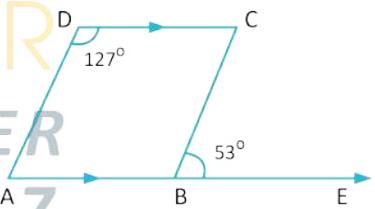
b) Find: the length of CD



4) In the opposite figure:

$\overline{AB} // \overline{DC}$, m(∠EBC) = 53°, m(∠D) = 127°,

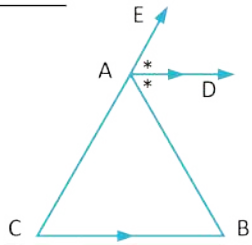
Is $\overline{BC} // \overline{AD}$? State the reason



5) $\overrightarrow{AD} // \overline{CB}$, $\overline{AD}$ bisects ∠BAE

, m(∠ B) = 52°,

Find m(∠BAD) , m(∠ C)



SECOND GEOMETRY

ANSWER MODEL

Q1: Choose the correct answer:

1) c
2) a
3) b
4) a
5) b
6) c
7) c
8) b
9) c
10) a
11) a
12) c
13) a
14) d

Q2: Complete the following:

1) hypotenuse and one side of them congruent to another.
2) 120°
3) congruent
4) parallel
5) perpendicular
6) included angle
7) equal in measure
8) AB // CD
9) supplementary
10) parallel

FIRST ALGERBA

ANSWER MODEL

Q1: Choose the correct answer:

1) a	6) d	11) d	16) c
2) b	7) c	12) d	
3) a	8) b	13) d	
4) a	9) c	14) c	
5) c	10) a	15) d	

Q2: Complete the following:

1) b
2) $2y^2$
3) -2 , zero
4) $-2m^2$
5) 11
6) 3x
7) zero
8) $-2a^2b$
9) 1